

AUSTRALIA IN THE WAR OF 1939-1945

SERIES FIVE
MEDICAL

VOLUME II
MIDDLE EAST AND FAR EAST

AUSTRALIA IN THE WAR OF 1939-1945

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MIDDLE EAST AND FAR EAST

by

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"I would say that two contrary laws seem to be wrestling with each other nowadays: the one a law of blood and death, ever imagining new means of destruction and forcing nations to be constantly ready for the battlefield—the other a law of peace, work, and health, ever evolving new means of delivering man from the scourges which beset him. Which of these two laws will ultimately prevail God alone knows."

(Louis Pasteur)

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ABBREVIATIONS

- A.A.N.S.*—Australian Army Nursing Service.
A.A. & Q.M.G.—Assistant Adjutant and Quartermaster-General.
A.A.M.C.—Australian Army Medical Corps.
A.A.M.S.—Australian Army Medical Services.
A.A.S.C.—Australian Army Service Corps.
A.B.D.A.—American British Dutch Australian.
A.D.G.M.S.—Assistant Director-General Medical Services.
A.D.M.S.—Assistant Director Medical Services.
A.D.S.—Advanced Dressing Station.
A.G.—Adjutant-General.
A.G.H.—Australian General Hospital.
A.I.F.—Australian Imperial Force.
A.M.D.—Army Medical Directorate.
A.M.F.—Australian Military Forces.
A.R.C.S.—Australian Red Cross Society.
A.W.C.—Allied Works Council.
- B.M.A.*—British Medical Association.
- C.C.C.*—Civil Constructional Corps.
C.C.S.—Casualty Clearing Station.
C.M.C.C.—Central Medical Coordination Committee.
C.R.S.—Corps Rest Station, Camp Reception Station.
- D.A.D.H.*—Deputy Assistant Director Hygiene.
D.A.D.M.S.—Deputy Assistant Director Medical Services.
D.A. & Q.M.G.—Deputy Adjutant and Quartermaster-General.
D.D.S.T.—Deputy Director Supply and Transport.
D.G.A.M.S.—Director-General Army Medical Services.
D.G.M.S.—Director-General Medical Services.
D.R.S.—Divisional Rest Station.
- E.M.S.*—Emergency Medical Services.
E.P.I.P. Tent—European Privates Indian Pattern Tent.
- Fd. Amb.*—Field Ambulance.
- G.O.C.*—General Officer Commanding.
- H.E.M.S.*—His Egyptian Majesty's Ship.
H.M.A.S.—His Majesty's Australian Ship.
H.Q.—Headquarters.
- I.G.M.S.*—Inspector-General Medical Services.
I.M.S.—Indian Medical Services.

M.A.C.—Motor Ambulance Convoy.
M.D.S.—Main Dressing Station.
M.E.—Middle East.
M.E.C.C.—Medical Equipment Control Committee.
M.G.—Machine-gun.

N.E.I.—Netherlands East Indies.
N.C.O.—Non-Commissioned Officer.
N.Y.D.N.—Not yet diagnosed Nervous.
N.Z.—New Zealand.

O.R.—Other Rank.

P.O.W.—Prisoners of War.

Q Branch—Quartermaster-General's Branch.

R.A.A.F.—Royal Australian Air Force.
R.A.M.C.—Royal Army Medical Corps.
R.A.N.—Royal Australian Navy.
R.A.P.—Regimental Aid Post.
R.D. Tent—Ridge Double Tent.
R.M.O.—Regimental Medical Officer.

S.B.—Stretcher Bearer.
S.B.A.—Sick Berth Attendant.
S.E.A.C.—South-East Asia Command.
S.M.O.—Senior Medical Officer.

T.A.B.—Vaccine of Typhoid and Paratyphoids A and B.

V.A.D.—Voluntary Aid Detachment.
V.D.C.—Volunteer Defence Corps.

W.E.—War Establishment.
W.W.—Walking wounded.

PREFACE

THIS volume is the first of two devoted to the medical story of the Australian Army during the war of 1939-1945. Part I of the volume follows the formation of the 6th, 7th, 8th and 9th Divisions of the A.I.F., and of the I Australian Corps in the Middle East, their training and preparation, medical organisation in Australia and overseas, and the campaigns in the Middle East. The narrative pursues in the main a chronological sequence till the end of 1941, occasionally digressing to describe contemporary events in Australia, but certain other variants in the time pattern have been necessary. Towards the close of 1941 the story has to follow the working out of a threefold destiny; that of the I Australian Corps in its unfulfilled assignment in the Far East, and its eventual return to Australia; that of the 9th Division, left to play Australia's part in the critical battle of El Alamein in 1942, and that of the 8th Division, committed to a bitter campaign in Malaya. El Alamein belongs to the Middle East series, and is therefore included in Part I of this volume. So too is an account of medical work amongst prisoners of war who were captured in the Middle East and held in Europe.

Part II opens with the move of the corps headquarters with the 6th and 7th Divisions, and the events which caused them to return *via* Colombo to Australia. It then deals with the fate of the defence forces sent to Timor, Ambon and New Britain and of the 8th Division in Malaya.

At this point the finger of time is allowed to stretch forward to the end of the war, so as not to interrupt the sequence of the remarkable medical story of these forces in captivity in the Far East, sadly depleted and sorely tried, but never broken. Therefore the history follows them through the actions on Timor, Ambon and New Britain, through the belated efforts to defend Sumatra and Java, through the campaign in Malaya, through the trials of the prison camps, and so to the day of liberation. In Volume III the narrative will return to 1942 and take up Australia's island war in New Guinea and the Solomons, and the concluding phases in Borneo.

Problems of scope and scale arise in the recording of these events; their solution has been aided by discussions between the medical historians of the Commonwealth Nations. A comprehensive history can only be looked for from a nation of great resources and widely disposed forces under arms, while the history of a small nation may be more intimate, and written on a lower military level. Therefore the Australian Medical History is presented with a moderate degree of detail and is projected against a background of regional and world events so as to make clear their strategic and tactical importance and their bearing on medical planning. In these brief accounts full justice cannot be done to individuals, even if it were possible to do so. Biographical footnotes are not included in the medical volumes. By agreement with other medical war historians, and in accordance with the general policy of the Australian War History, references to decorations are omitted.

The various phases of administration are dealt with in separate chapters which follow the chronology of the story in a general way, so as to make clear the building of a medical organisation at home and abroad in support of a fighting force.

All the chapters in this volume have been submitted to critics fitted by knowledge and personal experience to check the accuracy and fairness of the story and the opinions expressed. Many such helpers have given me frank and valued criticism, and have filled gaps in the records. The courage and persistence of prisoners of war who made and preserved valuable records, often at personal risk, deserve special mention.

I am greatly indebted to Mr Gavin Long for his advice and help; and to the members of his staff for assistance, particularly in access to material. My earlier personal assistants, Lieutenant G. Cutler and Corporal D. B. Stinton of the A.A.M.W.S., and Miss G. M. Jones helped me to collect and summarise much of the original material for this volume. Mrs Evelyn East in the research field and Mrs Gladys Pope in the secretarial have given invaluable assistance in assembling, criticising, correcting and checking this volume and obtaining and arranging illustrations. The work of Mr H. W. Groser as cartographer will, I feel sure, often clarify details of military events and plans more than the text.

The successive holders of the post of D.G.M.S. of the Army and their staffs have added to this volume in numbers of ways. Mrs Downes generously allowed me to use and keep over extended periods the diaries of the late Major-General R. M. Downes. Major-Generals F. A. Maguire and S. R. Burston have clarified a number of issues for me, and Major-General F. Kingsley Norris and his staff continue to help in obtaining information and records. I am specially indebted to Lieut-Colonel A. Christie, Lieut-Colonel G. H. Fullbrook and Warrant Officer Colliver. The staff of the Army Records have also been most cooperative in supplying statistical information. In Canberra, Colonel J. L. Treloar, Director of the Australian War Memorial, allowed me to have large quantities of medical records for continuous reference, and Mr W. A. McLaren and various members of his staff in the Department of the Interior have helped us, particularly in accommodation and working conditions, and photographic work on illustrations. My medical colleagues have taken a practical interest in the work, have given me much valuable material and have encouraged me in this slow and laborious task. I am particularly indebted to Dr Mervyn Archdall, Editor of *The Medical Journal of Australia*, for his most helpful reading and criticism of the typescript.

In accordance with the policy of the Australian War History I again point out that I have used as a source of some of the material, my own experiences while acting as the physician-in-charge of the medical division of the 2/1st Australian General Hospital and of the 113th Military Hospital Concord, and as a Consulting Physician to the Army at the Australian medical headquarters and in the field.

A.S.W.

Canberra, 9th October 1951

PART I

CHAPTER 1

THE INTER-WAR PERIOD, 1919-1939

LOOKING back to the years immediately following the 1914-1918 war, we can discern a national somnolence in matters of defence. Even the disillusionment of this period and the exposure of the fallacious promises of world peace failed to stir general interest to the point of action. Neither a war-experienced generation nor its sons and daughters were willing to believe that the madness of war could be repeated. This was no doubt a natural rebound. Social and economic changes which have been continuing steadily through previous years accelerate with staggering swiftness after a war. Reconstruction presents vast problems to a restless and dissatisfied people. A post-war community doubts the commonsense of the beatitude which extols the blessedness of giving, and bends its energies to taking, for have not the years stolen youth and comfort and opportunity? It is argued that war will not come again for a generation, and in that time a nation can grow strong in the arts of peace. In the face of the resultant inertia it is hard to stir interest in military affairs, and to maintain it takes great singleness of purpose and tenacity. For these qualities we owe thanks to a small band of devoted people who made plans for a possible emergency. It is not surprising that the study of military medical matters often had to struggle for attention during these absorbing post-war years, but its light was never wholly dimmed, for numbers of the medical war veterans kept their enthusiasm alive and communicated it to others of a younger generation.

These inter-war years, then, are worth a study. What was the status of service medicine in 1919, and what was its purpose? What problems awaited solution, what challenges were flung to the next generation? How did these affect the medical and allied professions in the community, particularly with regard to organisation? On this stage of twenty years were reflected the change of ideas of a generation, its aims and motives. Of no less interest are the strivings of the protagonists, wherein we may trace two of the great human incentives, the quest for better things and the quest for power.

Colonel A. Graham Butler in his *History of the Australian Army Medical Services 1914-1918* reviewed the status of service medicine at the end of this period. He pointed out in his summing up that the technical military status of the Australian Army Medical Services was greatly enhanced during this war, but that this military advance weakened to some degree their mandate to humanity, in the fulfilment of which their ideals may be expressed. Butler thought that the services were at the parting of the ways in 1918: the problem was to reconcile these ideals with a complete devotion to purely military ends. However, the vast expansion of medical science which had begun well before 1914 continued with such vigour that higher medical standards would inevitably be demanded in war as in peace. In the unfolding of the medical story

of the 1939-1945 war we cannot give the complete answer to Butler's question "*Quo vadimus?*", but even in this period 1919-1939 there were indications as to the path to be followed. Three phases may be distinguished during the years following the "Great War". The first of these is strongly marked by the influence of Major-General Sir Neville Howse, whose ability, forceful character and personal prestige had done much to gain the Australian Army Medical Corps a degree of that authority which its record of achievement warranted.

The lessons of the war pointed to the need for internal changes; so appeared the first objective, reorganisation of the medical services. In this was bound up an important principle, the attainment of a greater degree of independence. There was a strong feeling in the medical profession that the medical corps should have more direct representation in the higher councils of the army and not be exposed to the risk of becoming a technical sub-department of the Adjutant-General's Branch. Experiences during the war had shown that this risk was not negligible. Suggestions for reorganisation were not confined to the army services, in which arose a movement in favour of amalgamation of the navy, army and air force medical services under unified control. Centralisation of command occupied a prominent position in general military and popular thought in 1919. Had not the Allies heaved a sigh of relief when it was agreed that Foch should unify the high command? There were also signs that a wide coordination of service and civilian organisations might be achieved. The medical profession as a body had made preliminary steps towards this end, as will be shown, even though these had not produced any immediate result. Within the services, however, there was by no means unanimity as to the advantages of securing this second objective of amalgamation. The navy and the air force, though numerically small when opposed to the army, powerful in size and in the possession of a strong medical leader like Howse, were never at any time really in favour of this step. A third aim in reorganisation was the control of medical supplies and equipment in time of national emergency.

This first phase of medical developments within the Services shows a continuity of motive derived from the war period; it represents an attempt to introduce certain reforms which then seemed logical and fruitful for the future. The setting was one of changing scenes. Recognition of the medical needs of any scheme of defence became more difficult to win in the midst of a deceptive prosperity, and as time went on the memory of war became more distant. During this phase the parties concerned in moves and counter-moves were the medical arms of the three fighting Services, the Commonwealth Department of Health, and the general body of the medical profession, whose opinions were voiced by the Federal Council of the British Medical Association in Australia. The reforms contemplated included, as already pointed out, an internal reorganisation of the Australian Army Medical Corps, unification of the navy, army and air force medical services, and coordination of the total sum of men and material concerned in the medical aspects of defence.

FIRST MOVES FOR REORGANISATION AND COORDINATION

In 1917 one of the first moves to effect some degree of coordination of the medical services in time of war was made by the British Medical Association in Australia. During the 1914-1918 war, the need for more coordination was felt in many medical quarters. More or less isolated efforts were made in some parts of Australia, as in South Australia, to organise the total war effort of the medical profession, but there was no general agreement on the subject. Had the call-up of the militia been the prelude to a wider conscription the medical profession would of course, have had its own problem solved, but the people decided otherwise. But in April 1917 when the strain of war was very heavy, the Federal Committee of the B.M.A. took a vote of the profession in each State on this question: "Are you in favour of the Federal Committee requesting the Federal Government to pass legislation to bring about compulsory enlistment of the medical profession in Australia for service with A.I.F.?" It was agreed that a three-quarters majority would be necessary before any move was taken. The plebiscite was taken on 17th July; only 52 per cent of the practitioners replied, and of these the majority in favour was 74.28 per cent. This result was communicated to the Acting Prime Minister, who held out no hope that the desire of the majority would be made the basis of a radically different policy. Major-General R. H. J. Fetherston, one of the councillors, later pointed out that the vote was not representative, inasmuch as large numbers of doctors were overseas and could not vote, and it was only for A.I.F. service and not for all forms of military service.

This scrap of history is retold, as it sheds light on the action of the B.M.A. in 1919. The Federal Council approached the Acting Minister for Defence and requested an opportunity to examine and comment upon the report of a committee then being appointed to advise on questions of reorganisation of the A.A.M.S. This request was granted by the minister. The committee consisted of Colonel G. W. Barber, Colonel R. M. Downes, and Lieut-Colonel T. E. V. Hurley under the chairmanship of General Howse, with the Military Secretary Brigadier-General T. H. Dodds as adviser. Its terms of reference were to consider and formulate schemes for reorganisation, including the utilisation of the whole medical profession in time of need. In this can probably be seen the influence of Howse, who had always advocated fuller control of the profession in time of war. Early in 1921 the committee met, and when the report was presented to the Minister for Defence there were appended for his information the comments of the Military Board on each subject and also the comments and suggestions of the special committee of the B.M.A. The subjects are still of great interest after twenty-five years. They included military hospital accommodation, the training of medical graduates and students, and of orderlies and ambulance transport. Military supervision was urged over the training of all nursing and transport services likely to be used in time of war, including those organised by the Order of St. John and the Australian Red Cross Society, in particular

the Voluntary Aid Detachment. The value of these voluntary aids, both male and female had been considerable during the war, and the continuance of their use and training was recognised as most desirable. It was justly stated that no camp hospital could be complete without fully trained female nursing staff. There is even today a prophetic ring about some of these recommendations. In addition, anomalies of seniority in the A.A.M.C. were ventilated. It was possible then for a medical officer to give long distinguished service in the A.I.F. and yet remain junior to others who had been taken on the strength of the Australian Military Forces before transfer to the A.I.F. Similar anomalies arose during the recent war. The provision of specialist advisers to the D.G.M.S. was also strongly recommended.

MILITARY STATUS OF THE ARMY MEDICAL SERVICES

While these matters were being discussed a most controversial question was tackled: the status and authority of the Director-General of Medical Services. Sir Neville Howse had succeeded Major-General Fetherston as D.G.M.S., and when he resigned to enter politics the position of his successor brought up some urgent questions. In spite of protests from the B.M.A. both the Minister for Defence and the Military Board were content to state the rank of the Director vaguely as "colonel or major-general". Fortunately, Major-General Barber when appointed D.G.M.S. in 1922 was eventually granted the senior rank, which the position has carried since. It is well to point out here that he had no other permanent medical officers on his staff, a fact which had some bearing on subsequent negotiations about amalgamation of the services.

The committee recognised that great difficulties existed in the relations between the D.G.M.S., the Adjutant-General and the Military Board, and stated that the existing system had never been satisfactory. Australian experience agreed with that of other military establishments where a similar condition prevailed: the system worked well only if temperaments were suitable. The committee recommended that the D.G.M.S. should have full control of his department, and, though it was not advised that he should be a member of the Military Board, it was further recommended that he should be responsible to that body, and have direct access to the minister. The B.M.A. sub-committee further commented that no orders should be issued by any branch with bearing on the administration or organisation of the medical services without the previous knowledge and consent of the D.G.M.S. The Military Board reacted to this by minuting that no military administration would dream of doing so. This reply virtually negated the B.M.A.'s implied suggestion, but it was none the less fallacious, for the full medical implications of apparently simple measures are not always obvious to laymen.

The Howse Committee, after consideration, proposed the following: (1) That he, the D.G.M.S., should be able to communicate with the Chief of the General Staff, the Quartermaster-General, and the Finance Branch direct keeping the Adjutant-General informed, (2) that he should

be present at meetings of the Military Board when important questions concerning his department were discussed, (3) that if the A.G. did not concur with important recommendations of the D.G.M.S. the matter should be referred to the Military Board, and that there should be right of appeal to the minister, and (4) that the D.G.M.S. should be informed of any communication of the Military Board affecting medical services. In support, it was pointed out that on active service Deputy Directors and Assistant Directors of Medical Services have direct communication with all members of the staff of the formation, and have direct access to the commander. With these provisos it was agreed that the D.G.M.S. should continue on the staff of the Adjutant-General.

The Military Board thought that the D.G.M.S. should remain on the staff of the Adjutant-General, but should be able to request him to refer matters to the Corporate Board. Direct appeal to the minister found no favour in their eyes, but the minister, Sir George Pearce, approved, provided the A.G. was informed. Attendance at meetings of the board was also approved, though this does not seem to have been carried out in practice.

These matters are worth recording in detail, for the questions raised have not dwindled in importance. In understanding them it is necessary to realise that an extraordinary technical expansion of the resources of medical practice was taking place about the time of the first world war. There was in fact a clinical and scientific revolution in medicine: this had important effects on the military machine, though changes were not effected without some struggle.

These problems are worth study today. It cannot be denied that difficulties do exist in this and similar relationships. Probably there is no technical subject which arouses so keen an interest among intelligent people as medicine, or in which the lay mind holds so firmly its own views and convictions. Smooth and harmonious progress in the joint cause depends perhaps more on the coefficient of friction between the personalities involved. As this story progresses it will be seen that such difficulties are not always illusory.

The work of the committee bore fruit chiefly with regard to improvements in the internal organisation of the army medical services. The following recommendations were made. The D.G.M.S. should be a whole-time officer of the rank of major-general, appointed for five years at a minimum salary of £1,500. He was not to be a member of the Military Board, but should have direct communication with the Chief of General Staff, the Quartermaster-General, and the Finance Department provided the Adjutant-General was informed. His staff was to include a part-time assistant with the rank of lieutenant-colonel, a dental and pharmaceutical staff officer, matron-in-chief and a permanent quartermaster. Provision was made for specialist professional advisers and in time of war for a Deputy Director with the rank of colonel. Part-time Assistant Directors and Deputy Assistant Directors of Medical Services were appointed for the militia divisions raised in the various military areas of the Commonwealth.

The frame of this skeleton organisation was not filled in until 1923, but in the meantime there were enough enthusiasts available to bring to the medical problems of defence their personal experience and knowledge.

THE MOVE FOR AMALGAMATION

During 1922 a wider field of service medical organisation was opened. The general subject of coordination had been in the air for a long time, even before the 1914-1918 war. In 1909 Mr Asquith, speaking in the House of Commons on the functions of the Defence Committee, stated that in all countries of the world, and in particular in Britain, the necessity was felt for coordination of the work of the army and navy. This general statement no doubt expressed in a general way the ideals of those interested in defence, but in addition there were many advocates of a high-level unification of control.

In 1922 the interest was crystallised by the holding of a coordination conference to examine the desirability or otherwise of amalgamating the medical services of the Australian Navy, Army and Air Force. Representatives of the Naval, Military and Air Boards considered those activities of the three arms which possibly could be coordinated or even brought under unified control. This conference recommended that there should be a single Australian Medical Corps, with a single administrative medical section the head of which would be responsible through heads of the individual services to the boards concerned. Mechanism was suggested to ensure that technical advice would carry full weight. In March 1922 the conference expressed the opinion that such amalgamation was both feasible and desirable. The service heads concerned, Major-General Sir Neville Howse, Surgeon-Captain E. T. P. Eames and Squadron Leader A. P. Lawrence stated that past experience had shown that efficiency and economy had not always been served, owing to the disadvantage of the medical branches of the navy, army and air force "competing in open market and working in water-tight compartments with all the attendant friction and difficulties".

In July 1922 the minister approved of the plan for amalgamation, and preliminary directions were given to prepare the three services for the change. But, though there was a suggested unanimity among the service representatives, the heads of the naval and air force medical services were opposed to the idea of amalgamation, and held that though funds might be saved, efficiency would suffer. The influence of Howse and the minister exerted enough pressure to confer approval on the scheme, but there the matter rested, more or less in suspense.

Meanwhile General Barber was appointed D.G.M.S. and pursued the further organisation of his widespread command. The matter of further coordination was not dead, and in 1925 the fermentation of interest brought forth some active advocacy on both sides. The Royal Commission on Health in 1925 had recommended the coordination of the navy, army and air force medical services under one Director-General and the B.M.A. through its Federal Council, pressed for some forward step to implement

the recommendations of the 1922 conference. Later in the year the First Naval Member (Rear-Admiral P. H. Hall Thompson) who had not been concerned in these earlier recommendations, criticised the suggested organisation as nebulous and full of administrative difficulties, though he thought that further cooperation was possible and desirable. The D.G.M.S. of the Army wanted some clear indication of policy, and was anxious too for closer cooperation. Sir Neville Howse, who had entered politics and was now Minister for Defence, desired the committee appointed by the Coordinating Conference to examine the proposals and to recommend the best methods of giving effect to them. This body was unable to reach full agreement. It was considered that the services were already running with efficiency and economy. Naval opinion opposed unification. The air force had strong objections and believed that neither efficiency nor economy would result. General Barber was, at his own request, given facilities for becoming acquainted with conditions of the three services. He recommended that a single directorate of defence medical services should replace the three existing directorates, but failing complete unification he agreed with the formation of an advisory committee to further the cause of coordination.

There is no doubt that a general feeling existed that something should be done, but beyond this there was at the time no real agreement. Information was sought even from the Secretary of State for Dominion Affairs concerning the scope and functions of the Committee of Chiefs of Staff then recently instituted in England. It was explained that this system preserved the responsibility of Cabinet in deciding policy, and of ministers for carrying it out, that broad aspects of questions were discussed by the Chiefs of Staff Committee, and the working out of individual problems was done by the Chiefs and their own staffs. Contacts with them and with other defence sub-committees had proved most valuable in furthering mutual understanding and widening the scope of the whole body without interfering with freedom. This had only a very general bearing on the Australian problem. Possibly it increased the general feeling of caution, although draft regulations were actually drawn up in a minute for the Executive Council to give effect to the original plan. In the end, amalgamation of the three medical services was never achieved, although the medical arrangements of air force and civil aviation were brought under the general control of D.G.M.S. Army in 1927 despite a minority protest from the medical representative of the R.A.A.F.

The D.G.M.S. of the Army thus became responsible to the Air Board for the organisation and administration of the medical services of the air force. This arrangement did not conform to the original plan for amalgamation, in which one Director of Defence Medical Services was to coordinate the work and policy of the three services, each of which would retain its own immediate director. While the air force remained small and the demands of its medical services were few the arrangements worked with a reasonable degree of satisfaction, though the air force medical service felt that it was in a completely anomalous position during

an important formative period. In actual practice the D.D.M.S. Air still remained the technical adviser of the Air Board. It was but a half hearted effort to save the entire dropping of a plan which had appeared desirable to some of the post-war planners.

There were probably several reasons for the abandonment of amalgamation. Tradition no doubt carried great weight, especially with the navy, and economy alone perhaps did not seem a sufficiently cogent reason. In addition, by 1927 the general aspect of world affairs was less favourable. Uneasiness was growing through the whole world concerning the stability of the financial system; and the premonitory shadows of the world wide depression were beginning to fall. It was also becoming evident that grand phrases about the "war to end war" were based on hollow human illusions, and the thoughtful could see difficulties and danger ahead. It was realised too that coordination to be of full value in defence must take into account the civil community also. In addition, concerted action by the British Commonwealth of Nations could be seen as even more desirable than ever, and it is likely that those responsible for defence would be loth to depart alone on any radical course.

FURTHER STEPS TOWARDS MEDICAL COORDINATION

The second phase of post-war reorganisation of the medical services began in 1927, when defence requirements obviously demanded a more expanded policy. Under the direction of Lieut-Colonel H. D. Wynter of the Staff Corps, the Commonwealth War Book Paper No. 13 was produced. This secret document included a plan for the coordination of the medical services in respect of civil, military, naval and air requirements. In the drawing up of this, technical assistance had been obtained from Fetherston and Barber, both experienced in directing the army medical services, and R. M. Downes, also experienced in military administration, and still engaged therein part-time, and versed in the affairs of policy of the civil medical community.

Personnel, civil medical establishments, medical equipment, drugs and coordination of the three medical services in times of war were reviewed in this document and recommendations were made. Civil mobilisation of the medical profession was pointed out as a step that might be necessary in time of war and at least advisable for a Government to consider. It cannot be too clearly stated that this serious consideration of the related problems was a landmark in the history of the efforts made to plan sanely and safely for the civil community and all arms of the services in times of war. It was obvious that in the event of war, plans would be necessary for an increased output of medical officers, for possible expansion of civil health services, and particularly concerning hospitals, both public and private. Stocks of drugs would need to be assessed, questions of supply considered, the manufacture of medical and surgical equipment in Australia would need to be greatly increased and all such stocks would have to be controlled. This document suggested procedures for the precautionary stage and the stage of actual mobilisation.

Before the end of 1927, a joint committee had met at the instance of the Department of Defence, representing all medical services, with the task of examining the suggestions made in the War Book. The chairman was Major-General G. W. Barber, D.G.M.S., members were Dr J. H. L. Cumpston, Director-General of Health, Surgeon-Captain L. Darby, R.A.N., Director of Naval Medical Services, Lieut-Colonel Wynter, Director of Mobilisation, and Squadron Leader A. P. Lawrence, Director of the R.A.A.F. Medical Services. This committee which first met on 9th December 1927, favoured the joint acquisition of medical stores by the three medical services to meet their requirements, though the R.A.A.F. representative disagreed, considering that his service should be empowered to make independent arrangements for medical supplies. The importance of maintaining reserve stocks in time of peace was stressed, and to this end the minister was advised that quantities of supplies not obtainable from Australian sources should be imported, and that local production of medical material not yet produced in Australia should be stimulated. The committee recommended that a system of control and rationing of medical supplies should be prepared which could be put into effect if necessity arose. Such control would not be exerted without sanction of the Government, and would be imposed equally on the requirements of the services and the civil population. The War Book suggested that control of medical supplies in emergency should be vested in a committee presided over by the Director-General of Health and including representatives of each of the defence medical services and of the medical profession, with a combatant officer. The committee however, recommended that these and other powers be placed in the hands of the Department of Health, giving it unfettered authority. The effect of this would be far-reaching, as this department would then be responsible for

- (1) preparation in peace of schemes for controlling the medical profession and medical supplies,
- (2) the putting of these plans into effect in case of war,
- (3) recommendation to the Government of estimated requirements for reserve stocks of medical supplies in peace and special importations of them on the outbreak of war,
- (4) arranging for acceleration and increase of local production of medical supplies in Australia.

This method of control proved to be a most contentious matter, particularly with regard to the control and disposal of doctors both for the services and the civil community. However, this report was approved by the Minister for Health, and a second committee was appointed to discuss mobilisation of the medical resources of the Commonwealth in time of war. Dr Cumpston presided, General Barber and Lieut-Colonel Wynter represented Defence and Dr Downes the medical profession. Dr F. W. A. Ponsford and Major V. P. H. Stantke also attended. The numbers of medical officers likely to be required in the event of a full scale war were estimated, and it was apparent that mobilisation would cause so great a dislocation of the medical services of the community that some

form of national control would be needed without delay. Such control was considered to involve the principle of administration by the permanent head of the Health Department in association with a strong advisory council. Local State councils were also recommended. It was laid down that the senior administrative officer of the Health Department in each State would be recognised as the executive officer for all administrative purposes. It was further advised that medical practitioners and students should be liable for compulsory service, and that the former could be assigned to any professional work in any area or sphere prescribed by the Minister for Health. The necessary powers would be provided by proclamation by the Governor-General. This meeting held in September 1928 was followed by another in the following June in which the compiling of lists of medical supplies and their possible sources was discussed. Requirements and reserves were now to be placed on a definite basis.

The problem of personnel was not to prove so simple. Downes wished further time to study the whole position of control of the medical profession. His personal diaries and writings show that his opposition to the method of control recommended by both these committees was much stronger than the formal accounts of procedures suggest. At the third meeting in August 1929, General Fetherston, former D.G.M.S. attended by request and also supplied a memorandum on the control of the medical profession in war. He expressed his firm conviction that the supply of medical officers for the fighting Services should be controlled by each medical service director. He thought that civil requirements would adjust themselves naturally except in the event of a large scale war especially within Australia. He agreed that the Department of Health should provide the machinery for control, but with the proviso that there was close association with responsible representatives of the profession. He emphasised that in the event of grave military danger military needs must be supreme, and doubted if Parliament would ever give a civil department such autocratic power as must be given to a military commander. In such circumstances civil control of men and supplies would soon break down.

PROGRESS HALTED

The discussion at this meeting indicated that the War Book scheme provided the most practical basis for necessary action, but no formal vote was taken. It was intended that matters should be brought to a conclusion at the next meeting. This meeting was never held. Thus the question of the exact manner of control of the medical resources of the country remained unsolved. The military representatives on the committee were unanimous that control of the civil profession should not be exercised by military authorities, and thus were prepared to go to a civil department for their requirements, rather than to a committee. Examination of the suggested mechanism of control did not show clearly just what relation a medical advisory committee would bear to the senior administrative officer of the Health Department whether of the Federal or State administration. "Unfettered" authority was asked for: it is not surprising

that hesitation was felt by the medical profession even in the coordination of a service which is at once national in outlook and individual in application. Though it seemed regrettable that some *modus vivendi* was not worked out earlier, these discussions did good; the influence of Downes in delaying decision concerning the balance of power was of value in suggesting and shaping the coordination committees of the future.

In spite of the indecisive moves towards coordination of men and material, it appeared that the question of amalgamation of the medical services was not extinct when it was briefly stirred up again in a minute from the Department of Defence. This expressed the desire that the D.G.M.S. of the Commonwealth Military Forces should in addition to his responsibilities to the Military Board and the Air Board become responsible to the Naval Board for administration and control of the Australian Naval Medical and Dental Services from 1st May 1928. Like many another desire, this never reached fulfilment; though army kept a fatherly control over the air force medical services, the naval service maintained its independence.

In October 1929 a Labour Government was elected, and, as a belated echo of the conscription controversy of 1916 and 1917, one of its first acts was to abolish compulsory military training in Australia. On 1st November 1929 the compulsory obligations under Part 12 of the *Defence Act* were suspended. The effect of this was to place the existing military forces and cadets on a basis of voluntary enlistment and enrolment. This demanded some reorganisation in the A.A.M.C. and area medical officers were retained as before, but instead of being paid at a consolidated rate *per annum*, a scale of fees for services rendered was drawn up and approved. Fortunately, during the next decade there was sufficient enthusiasm to keep training at a reasonable level in the militia medical units.

FRESH EFFORTS FOR COORDINATION

In 1931 General Barber was still dissatisfied with the degree of coordination attained by the medical services of the Defence Department. Coordination existed between the Departments of Defence and Repatriation. The D.G.M.S. of the Army administered through his representatives in the various districts the medical services of the army. The D.D.M.S. Air had three permanent medical officers in the R.A.A.F., and one permanent dental officer and eight part-time medical officers in the Citizen Air Force, who acted under him. He also acted as the medical assessor for Civil Aviation. The Director of Naval Medical Services was entirely responsible for his branch in the navy. It should be noted that there had been no link between the R.A.A.F. and the R.A.F. medical service in Britain though the latter really set the pattern to be followed. Three years had now passed since the committee appointed by the Defence Department to consider a coordination policy had last met, and there were no reports indicating action to be taken. Barber urged that these important matters should be further considered.

Shortly after this another aspect of the coordination of defence medical work was raised by the Health Departments of Queensland and the Commonwealth. In 1932 the Commonwealth Department of Health suggested that certain naval and military medical duties should be performed by permanent medical officers of the Department of Health. This department suggested that there was much overlapping, and that it might be possible for most of the duties of the part-time service medical officers to be carried out more efficiently and economically by medical officers of the Commonwealth Health Service. The work of navy, army and air force officers was reviewed in the light of full reports from the responsible officers concerned.

It was pointed out that if medical officers of health could be used to carry out certain functions relating to the services, the general purpose of coordination would be served, but the Minister for Defence was satisfied that existing organisation was efficient and economical and that all necessary cooperation between the Defence Services and the other Commonwealth Departments was carried out wherever practicable. The Ministers for Health and Defence, after enquiry, agreed that there were serious drawbacks to the proposals and few if any advantages and therefore decided against them. This decision was undoubtedly wise. A dubious principle was involved, and it would have been unfortunate had the already slender links of part-time service in the naval and military services been further weakened.

On 24th March 1932 the Adjutant-General enquired from the D.G.M.S. if he thought further conference was necessary to increase efficiency. General Barber replied that his department was running well, and that the administration of R.A.A.F. and Civil Aviation medical services was being successfully carried out under his general control, the D.D.M.S. Air acting as his representative in air matters just as the D.D.M.S. did in the various military districts. General Barber hoped that he and the D.D.M.S. might be able to suggest further methods of coordination, but saw then no particular purpose for holding further conferences. At this time, however, the control of the air medical services by the D.G.M.S. Army was only nominal.

The civilian medical leaders, however, were still keenly interested and on 31st May 1932, the Federal Council of the B.M.A. again addressed the Assistant Minister for Defence concerning the desirability of establishing a combined medical service for the navy, army and air force. Certain grievances and disabilities of the naval medical officers were also represented. It may be noted in passing that the B.M.A. also drew attention to some unsatisfactory aspects of the relations of the Director of Naval Medical Services with the Naval Board, and urged that he should attend meetings of the board when medical matters were under discussion and should also have access to the minister. But in spite of these evidences of interest in the subject of coordination of the medical services, the general position remained unchanged for several years.

In January 1934 Colonel F. A. Maguire delivered the presidential address to the section of Naval, Military and Air Medicine and Surgery of the Australasian Medical Congress held at Hobart. He chose for his subject "A Plea for the Organisation of the Medical Services for War". In this he presented a plan for coordination of medical services which foreshadowed the constitution of standing medical committees for coordination, one central, and one in each State. He suggested special modifications of the precautionary measures for use in emergency. The chairman of the central executive committee would then be appointed by the Government, and his committee would control not only the supply and distribution of medical practitioners both to the services and the civil community, but also hospital accommodation and medical equipment. The training of civilians in auxiliary services such as the Voluntary Aid Detachments was included in the general plan. Civilian medical services would be under the general direction of a controller, who would work in conjunction with the B.M.A. and who would also direct the Public Health Services and the staffs of public hospitals. This controller in turn would be associated with a national service council. This organisation introduced the principle of a war council and a national service council both under the control of Cabinet. It was fitting that General Barber should draw the minister's attention to this scheme brought forward by one who was himself later to be for a time D.G.M.S. during the coming war.

On 19th August 1934 General Barber completed his term of duty as D.G.M.S. and relinquished office. He had made efforts to establish firmer bonds between the medical services, and laid a good foundation for the coming changes in organisation, with which he had been concerned rather than with technical advances. Major-General R. M. Downes succeeded him as Director-General of the Medical Services of the Army. He had been acting part-time as D.D.M.S. of the 3rd Military District, afterwards Southern Command, and relinquished surgical practice in order to become a permanent soldier.

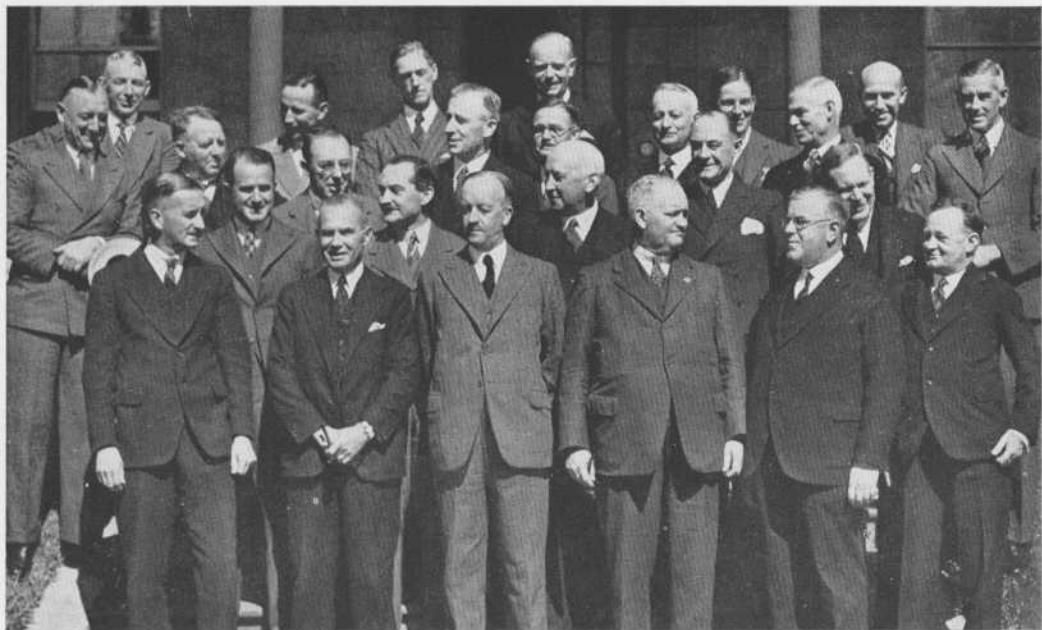
Downes assumed office at the beginning of the third phase of the inter-war period. Pacifist policy had reduced general defence measures overseas, and in Australia; the political leaders leaned rather on naval than military defence, which had only supplied two-thirds of the requirements of a militia recruited for service only within Australia. Three years earlier Japan had occupied Manchuria, and by 1933, Hitler's militarist party was in power in Germany. By 1935 the warnings of war were intensified and in 1936 the need for more practical and complete measures to ensure adequate preparation for mobilisation became pressing. Coordination in some workable form was obviously essential. The general trend of opinion at this time showed without doubt that medical control of the fighting Services must be distinct from that of the civilian community, and that the latter would be best served by central and State advisory committees.

As a general principle it seemed just that all fit medical practitioners should be liable for service in the forces and that doctors remaining in civil practice and medical students should both be subject to direction. Shortening of the medical curriculum in time of war was not regarded of itself a desirable measure, but its necessity might arise. While there seemed no likelihood of serious differences of opinion about principles in these matters, their implementation was likely to present problems.

It is interesting in passing to recall that in April 1936, while delayed action on this problem was pending, a medical tactical exercise was held in New South Wales. General Downes was always keen on such exercises, and for this he assembled the D.Ds.M.S. and A.Ds.M.S. and other senior officers of the various military districts and headquarters, the D.D.M.S. Air and many members of the Staff Corps. It was the first field exercise of the kind undertaken on this scale in the A.A.M.C. and lasted five days, beginning at Goulburn and ending at Wollongong. The subject of study was problems arising from a supposed invasion of the 2nd Military District by a Japanese force. It is now interesting to scan the prophetic preamble of this exercise, and on reading the names of those who took part one is reminded of what the medical services owed to these enthusiasts during the days of real war.

At the end of 1936, General Downes wrote to Dr Cumpston, Director-General of Health, who had been enquiring concerning the position of the committee of 1928-1929 and pointed out that the impasse reached by this committee had never been surmounted, and that plans and legislation had in consequence never been worked out. Early in 1937 Downes recommended that another committee be constituted, and later in the year this was approved by the Minister for Defence. This time the fresh start was successful, and in the more tense atmosphere of a threatened shattering of world peace the knotty problems were at last solved of what was to be done and who were to wield the necessary power.

Indeed the urgent necessity now supplied a further stimulus, for the European political scene was far from reassuring. Special reports of the Committee of Imperial Defence were to hand, and these gave a valuable lead in stressing the need for organisation and in indicating sound methods of approach. Accordingly the Defence Committee set up a new sub-committee to which was committed the task of recommending any variations deemed necessary in the medical plans laid down in the War Book Paper No. 13 in 1927. It was charged with examining the requirements in time of war of the armed forces, and the civil community in medical personnel and equipment and in hospital accommodation. It was recognised that many changes had taken place in the last decade, and this committee was thus not merely a revival of the original one, but started afresh. It met on 13th July 1938, and discussed all aspects of the above subjects thoroughly. Equipment was left to another body that was dealing with the matter, and as this is really a separate story its narration will be deferred a little. It was recognised that a detailed census of the medical profession was needed, which would permit an analysis of all groups and



Medical officers attending tactical exercise April 1936.

Front Row: Lieut-Colonel W. A. B. Steele, Major-General O. F. Phillips, Major-General R. M. Downes, Brigadier J. L. Hardie, Colonel F. A. Maguire, Lieut-Colonel W. Vickers.

Second Row: Major A. W. Morrow, Colonel A. L. Buchanan, Colonel N. L. Speirs, Major R. W. Walsh, Colonel G. W. Macartney.

Third Row: Major R. L. Bennett, Colonel H. N. Butler, Major E. L. Cooper, Colonel W. H. Donald, Colonel E. R. White, Colonel J. A. H. Sherwin, Colonel D. M. McWhae.

Back Row: Lieutenant A. Christie, Lieut-Colonel K. B. Fraser, Lieut-Colonel W. W. S. Johnston, Colonel S. R. Burston, Colonel C. G. Shaw, Lieut-Colonel J. Steigrad, Major K. A. McKenzie.



General Sir Thomas Blamey, G.O.C.



Major-General R. M. Downes
D.G.M.S. 1934-1941.



Major-General F. A. Maguire
D.G.M.S. 1941-1942.



Major-General S. R. Burston
D.G.M.S. 1942-1948.

types of work to be made to assist in correct allocation. Lines of enquiry for hospital accommodation were also suggested. This committee had before it reports of sub-committees of the British Committee on Imperial Defence which in 1937 had dealt with the problems of coordination of all medical arrangements in time of war, including hospital accommodation and transport. These reports were found a helpful basis for discussion and action, though it was recognised that the conditions were not similar in all respects, as the British plans were at the time largely concerned with the growing menace of air attacks on the civil community.

*THE CENTRAL MEDICAL COORDINATION COMMITTEE
IS BORN*

This meeting really confirmed the practicability of a coordination committee as an instrument for handling a national problem. On 4th and 5th August 1938 and again in September 1938, the same committee met and recommended that it remain in being as a standing committee for the provision of medical coordination in time of war. In so doing it actually became the Central Medical Coordination Committee which with its offshoots in each State did important work during the war. Its precise legal constitution was delayed till after the outbreak of war, but it was indeed fortunate that it was able to hold several meetings before that occasion and to provide the medical services with a flying start.

The great question of the means by which doctors would be controlled in time of war was at last settled. It was decided that the Central Standing Committee should coordinate arrangements for provision of medical men, material and hospital accommodation, but that on the outbreak of war it be merged into a central executive medical committee consisting of a medical officer of the Defence Department, the Director-General of Health, and a representative of the B.M.A. in Australia, under a chairman to be appointed by the Government. The committee was to be charged with the executive control of all relevant medical matters. The State committees comprised a medical officer of the Defence Department (the D.D.M.S. of the area) as chairman, two representatives of State Branch of the B.M.A., a representative of the State Health Department and a representative of the hospital authority (where the local control was not by the Health Department) with power to coopt other persons for special purposes. During time of war it was to be merged into an executive committee. It is curious that the central executive committee was never formed, the originally constituted central committee carrying on throughout the war. The reason probably was that the actual executive work was done by the State committees.

Medical personnel subject to direction included medical practitioners, dentists, pharmacists, trained nurses, voluntary aid members, physiotherapists instrument makers, X-ray technicians, and rank and file for the medical military units. Estimates were made of the doctors required and available, and also analyses of age groups. It was recommended that a *questionnaire* should be sent to all doctors in Australia to ascertain their

qualifications and the nature of service they were willing to perform. In the event of war the Medical Directors of Services were to requisition officers from the central committee. Other groups of medical personnel were also considered, and the difficulties and limitations of supply in certain of these were noted. It was considered that hospital accommodation for civilian casualties was sufficient, and the States had this matter in hand. Service hospitals were recognised as a necessity, though perhaps the committee did not then envisage the long struggles necessary before adequate hospitals were approved and built.

Ambulance transport was discussed fully. The committee recorded its regret that no uniformity existed in the dimensions of stretchers used in civil ambulances and those of army pattern. In view of the relatively small number of the former it was suggested that the State committees should use their influence to arrange for future motor ambulance bodies to take the army pattern stretcher. The importance of uniform standards in affecting all spheres of activity from the national to the domestic has gained recognition rather slowly in Australia.

Special recommendations made by this committee are of interest. The committee noted that the Federal Council of the B.M.A. had several times drawn attention to the desirability of the D.G.M.S. visiting the United Kingdom, and pointed out the necessity of this trip. It further noted that the medical services of the navy, army and air force lacked facilities for obtaining information about recent advances of proven value in medicine and surgery, and recommended that advisory councils of medical consultants should be appointed. The Air Board had already recognised the importance of keeping officers informed on technical subjects, and had a medical officer in England on exchange for two years from 1936 with the R.A.F., an officer from the R.A.F. meanwhile acting as Assistant Deputy Director of Medical Services. This action was due to Air Marshal Williams, and fully assented to by General Downes.

COORDINATION OF MEDICAL EQUIPMENT

An important component of medical preparedness was the coordination of all materials necessary for medical and surgical work. In 1927 when the War Book Committee examined the question of medical equipment certain general principles were accepted. These were valuable as guides to action; more could hardly be expected, especially in view of the technical advances made since the 1914-1918 war, on which much of the War Book planning was based. It was clearly advisable in an isolated country like Australia to devise methods by which medical supplies should be made available in time of peace to such extent as would render the position safe in the event of war. Such supplies could come from three sources: some were already produced in Australia; it would be possible to stimulate the local production of goods not hitherto made locally, and the remainder would still have to be obtained from overseas. Goods in the last category could with reasonable provision be imported on the threat of war "while the seas are open".

It was recognised that the Department of Health should control the provision of medical equipment in a general way, but no definite plans were made at the time. But though no executive body was formed for some years to take active steps along these lines, a practical interest was taken by the Health Department and army medical services. The army medical directorate started an active enquiry into medical supplies for field units, and hospital units and bulk supplies. In this financial limitations imposed a check, because only £5,000 a year was available for medical equipment. Stocks for hospital units and bulk supplies were non-existent in peacetime. In obtaining materials which could be bought at a general conformity with British Army standards was found helpful.

In June 1935 a special board was formed by the Defence Department consisting of the D.G.M.S., two D.Ds.M.S., two pharmaceutical staff officers, Major E. L. Cooper, A.A.M.C., and Lieut-Colonel J. H. Heath, a non-medical officer with experience of medical units. This board advised that all field medical equipment should be derived from Australian sources, not as hitherto from England. It was found that in stimulating local production no additional expense was incurred, a necessary condition, for the policy of the minister and the Military Board and of the Contracts Board was that of buying from the cheapest seller. One unfortunate result of this economy was that the firms usually supplied goods in temporary packages only, and thus were unable to gain experience in delivering them ready packed in containers appropriate for immediate transport and use. The board advised that where articles needed special containers they should be supplied complete. As might be expected, both at this time and later when locally made supplies were sought, it was occasionally difficult to induce manufacturers to make quantities which were unprofitable. An attempt was made to allow the commercial houses to import duty free goods used for defence purposes, as was done with British Army equipment, but permission was refused. Funds were insufficient to provide supplies for casualty clearing stations or hospitals, but a supply of containers left over from the 1914-1918 war was collected and later proved useful.

This board began a survey of the minimum essential requirements for war, and of the source of supply. What drugs would be needed on mobilisation? The list prepared contained thirty-five essential items, a figure undisturbed by later estimates. It was found that twenty-five of these were already produced or could be produced in Australia. It is interesting to look forward a moment to record that by 1943 twenty-two of these drugs were in production. It was considered that surgical dressings, which had caused some anxiety during the previous war, could be made in Australia. The board was sure that with few exceptions surgical instruments and appliances could be made in Australia. The initial requirements, however, could not be met in Australia. The replacement rate was worked out at 25 per cent.

The board paid special attention to vitally important drugs, such as morphine, atropine, cocaine and its congeners, and quinine. It advised

that large quantities of quinine be obtained; some anxieties might have been saved some years later if that advice had been adopted. About this time the War Office changed field medical equipment, but Australia did not follow in these changes. It would have demanded more funds than were available, and the desirability of the alterations was in some instances doubted. However, during the next three years the field medical equipment was redesigned and purchases made as far as possible.

In October 1935 a move was made to coordinate the supply of medical, surgical, dental and veterinary supplies for the whole community in the event of war. An army committee was in existence known as No. 7 Supply Committee (Food and Drugs), part of the organisation of the principal supply officer, and this was asked to examine the position. Coopting the D.G.M.S., the Director of Veterinary Services (Lieut-Colonel L. C. Whitfeld) and the D.D.M.S., R.A.A.F. (Group Captain Lawrence) this body concluded that six months' supply of surgical instruments was held by the army, all but nine items of necessary equipment were held either by the trade or could be locally made, and dental supplies were sufficient. Ordnance held 2,900 stretchers. The position about X-ray equipment was not very good: much apparatus was required, some of which would have to be imported. The committee recommended that the Supply Board place dormant orders in the United Kingdom for filling on the outbreak of war.

So far then, preliminary arrangements were made to secure adequate medical supplies in the event of war, but it was evident that a much more specialised body than the No. 7 Supply Committee would be needed. Should war break out it was evident that requirements would increase and stringency of supplies become more pressing, and the problem of coordination of control had not been touched.

In June 1938 a medical, dental and veterinary sub-committee of the No. 7 Supply Committee was asked for to care for both civil and service needs. Only one meeting was held on 11th November 1938. The members were the medical service directors. Some headway was made in ascertaining the annual requirements of civil hospitals, and the annual consumption of equipment and drugs. This committee was, however, too cumbrous in its connections, and freedom was essential for its complicated work. The Central Medical Coordination Committee had been formed in August 1938, and in its discussion recognised that equipment was so vast and so important a subject that it recommended the establishment of a medical equipment sub-committee of itself to deal with this alone. The Munich crisis in September hastened preparations, and it was decided at an emergency meeting of this proposed body to anticipate its formal taking over from the supply committee's offspring and to make lists of essentials in categories of varying urgency. At this meeting were Major-General Downes, Major E. L. Cooper (A.D.G.M.S.), Dr M. J. Holmes (representing the Director-General of Health), Major A. Christie of the staff of D.G.M.S. with Mr Brokenshaw, a trade representative, as technical adviser.

The lists of drugs and materials drawn up by this body comprised essential items not manufactured in Australia and were solely for civilian use. It was proposed that they should be bought from trust funds held by the Department of Health. It was fortunate that the Directors of the Health Department, and of the navy, army, and air force medical services were so prompt, practical and far-sighted. On 28th December 1938 the equipment sub-committee of the Central Medical Coordination Committee was formally approved by the Minister for Defence, and its first formal meeting was held on 24th January 1939. Its constitution remained the same, with the valuable addition of Dr M. J. Holmes, Dr B. L. Stanton and Mr W. R. Grimwade. No representatives of the navy, or air force were appointed at the time, but later this was done following a remonstrance from the Director of Naval Medical Services to the Department of Defence. In the meantime the position of the naval and air force medical services was rather nebulous: the D.N.M.S. was largely dependent on his own efforts for supplies, and no definite plans for the R.A.A.F. medical supplies were made apart from the general scheme.

Estimates of service requirements were now nearing completion, and civilian estimates were also presented. The difficulty in arriving at the latter was great as there were few data available. For example, it was not a simple matter to estimate the total hospital requirements of Australia, and the figures were eventually arrived at by multiplying by twenty-five the annual consumption of the Royal Melbourne Hospital. The Commonwealth Serum Laboratories were preparing a list of equipment as a guide to laboratory requirements, the Government was prepared to assist in encouraging the manufacture of glass tubing and surgical instruments, and it was proposed to produce glass ampoules when the special machinery was available. Consideration was also given to the growth of medical plants.

The labour involved in drawing up estimates and making plans of this kind was prodigious. Dr Holmes, Major E. L. Cooper, and Major A. Christie undertook this work and obtained a mass of information of extreme value. Mr A. J. Withers, who had done valuable work in assisting Colonel Butler with the compiling of the medical history of the last war, was also associated with these enquiries. Once again difficulties were found in persuading manufacturing firms to produce certain supplies in Australia because no certainty of reasonable contracts could be guaranteed. Certain items such as thermometers gave anxiety because of the high wastage rate which is notoriously hard to control.

In January 1939 an opportunity offered to obtain the desired civilian reserve supply of medical stores. International tension was then mounting and from some obscure cause a brief and apparently baseless alarm was raised at Darwin. A request was made by the Royal Australian Navy to the Commonwealth Health Department to carry out some urgent measures in view of the possibility of Darwin being used as an operational naval base. Realising the need for immediate purchase of essential drugs, General Downes sent a telegram to Dr Holmes who at the time was acting

as Director-General of Health. Dr Holmes, though on vacation, returned to Canberra immediately and conferred with Senator Foll, Minister for Health, who was about to leave Sydney to attend a Cabinet meeting in Hobart. A minute was hastily prepared, the Cabinet approved, and in February 1939, the Department of Health had in its possession the authority to purchase material to the value of £65,000. This was immediately set in train through the Commonwealth Serum Laboratories' buying organisation.

By July 1939, most of the drugs and equipment thus ordered had arrived. Some of the material could not be obtained at once; syringes and needles for example were hard to come by in bulk, but deliveries were spread out over twelve to sixteen months. Storage space was found in the A.A.M.C. stores in Latrobe Street, Melbourne for drugs needing periodic inspection, and other stores were placed in the quarantine building at Portsea, and the Government note printing branch vaults. Public hospitals were urged to order a year's supplies on their own behalf, and were given technical assistance in making up their lists of requirements, using the data already collected. The equipment sub-committee became autonomous at a later date, and its further work and powers will be described in following chapters.

THE D.G.M.S. GOES OVERSEAS

Major-General Downes was sent overseas at the end of March 1939 to collect information concerning the organisation and equipment called for should Australia be involved in war. Over a period of years this step had been urged; the Federal Council of the B.M.A. recognising its importance to the whole community had strongly urged such action on a number of occasions. Unfortunately, through delay in securing official approval the tour was begun too late for its full value to be attained, and the declaration of war forced Downes to leave Canada hurriedly to resume his now doubly important tasks at home.

MEDICAL MANPOWER

By this time the Central Medical Coordination Committee had collected figures related to medical manpower. It was estimated that in 1937 there were 5,083 male and 323 female medical practitioners in Australia. On full mobilisation some 1,160 medical officers would be required, including 70 for the navy, and reinforcements would be at least 10 per cent per year. Army and air force had 1,557 medical practitioners on their lists, 80 per cent of these being on the reserve, but of these it was considered that only 350 were physically fit for field formations. It was evident that the civil community could not be supplied with one doctor per 1,500 persons, as would be desirable, but at the figure of one per 3,000 adequate numbers of medical practitioners would still be available. This figure was actually below the average in all States of Australia at the outbreak of war, which was one doctor to 1,244 persons, the total number of doctors at that time being 5,610. During the war the figures were much less favourable than this in certain areas.

There were 3,000 dentists in Australia, 200 were on the reserve and 150 were needed for full mobilisation. Of 2,400 pharmacists not more than 40 would be immediately required. Over 600 nurses were on the army reserve list and 1,000 would be needed for full mobilisation. It was reckoned that there were 13,000 trained nurses in Australia; obviously only a percentage of these would be available.

Of the non-professional personnel only a trained nucleus was available, though the A.A.M.C. would require over 10,000 other ranks to make up its establishments. The V.A.D. had 1,800 female members and 1,500 would probably be needed to replace men in hospitals. All encouragement was therefore to be given to the Order of St. John and the Australian Red Cross Society to stimulate the building up of a valuable volunteer reserve of members. All three services were represented on the Central and State Councils of the Red Cross Society and the V.A.D.

A *questionnaire* had been sent out to all medical practitioners (see appendix). A high proportion of replies was received, though some arrived after that considerable latent period which seems inevitable in enquiries addressed even to highly educated sections of the community. The responses showed that apart from 533 who had retired and 303 who were abroad, 4,253 medical practitioners were available for some public duty in the event of war; 4,139 for duties of a military nature, and 3,495 for civil duties wherever required. From this information a card index system was prepared, and copies were supplied to the State committees. A similar census was suggested by the dental profession for its members, but this was not at this time considered necessary.

Now that mobilisation was much nearer reality a great deal depended on the few permanent medical officers of the services and those reserve officers who had voluntarily acquired a knowledge of military medicine. The army had only three permanent medical officers, the D.G.M.S. and two others, one at the Royal Military College, Duntroon, and one at Darwin. In addition there were a number of non-medical officers with experience in staff work. Outstanding among these was Major Christie, invaluable on the staff of the D.G.M.S. for his unique experience and knowledge of methods and procedure. There was a large reserve of medical officers, many of whom had not had any field experience, and had dropped all military interests in 1918. The backbone of the A.A.M.C. was composed of militia officers who had made part-time soldiering a living interest and had regularly attended camps and exercises. Some of the veterans of the 1914-1918 war gave their part-time service to administration in the various military districts of Australia; a few still commanded militia medical units. The part-time Deputy Directors of Medical Services were as follows: Queensland, Colonel G. W. Macartney; New South Wales, Colonel R. W. Walsh; Victoria, Colonel C. G. Shaw; South Australia, Colonel S. R. Burston; Western Australia, Colonel D. McWhae; and Tasmania, Colonel H. N. Butler. There were many other younger men who were content to qualify themselves for positions of responsibility in militia medical units by hard training and study, and

who brought to the service youth and keenness. In this respect the A.A.M.C. was unique, as it did not possess the advantage of a backing of permanent officers as in the British, Canadian, Indian and South African Armies, but depended on the zeal and enthusiasm of its part-time officers.

There is no doubt that the constant competition of civil practice and the sharpening of mind by University and hospital teaching enabled these men to set a high standard of service medicine. Tactical exercises were carried out as frequently as practicable, and in this way a knowledge of the constitution, equipment, administration and tactical handling of army medical units was diffused through another generation of doctors. The duties of regimental medical officers and the routines of field ambulances and casualty clearing stations were studied, and the more senior militia officers qualified for administrative positions. General hospitals existed only on paper; this was not of great importance, though it was evident that a number of officers appointed to such units on the outbreak of war would need a course of training either in army schools, or in the harder school of experience. Dental officers were similarly trained in the militia, to which they gave valuable service; some in particular acquired an outstanding knowledge of procedure afterwards put to good use.

The navy had experienced a slump period some years after the 1914-1918 war, but had made conditions of service more attractive for medical men, and had a good nucleus of permanent medical and dental officers. To these could be added sufficient reserve officers of good professional attainments to complete requirements for sea-going and shore establishments on mobilisation. Particular care had been directed to the technical training of expert sick berth staff, and fifty-nine of these were available.

The air force medical service, though lacking the freedom of a service dependent only upon its parent service, had a sound foundation laid. Like the naval medical service, it recognised the value of a permanent professional staff, and by its system of oversea exchanges had facilitated organisation, standardised methods and fostered a growth of knowledge of its specialised problems. At the outbreak of war there was a nucleus of thirteen permanent medical and dental officers, and ten on the reserve.

The value of the work of the non-professional members of the medical services must not be overlooked. Unfortunately, the numbers of men trained in technical procedures and administration were small, but they formed a useful core of reliable men.

Pharmacists were few in the peacetime establishments, but enough were available. No special provision was made for technicians for special departments such as those of X-rays or pathology. Nurses were available for the army from the reserve. In addition to those who had remained on the reserve since 1918 many other recent trainees had joined, though this merely meant that they were ready in case of need, for they were not used or specially trained during time of peace. A Matron-in-Chief controlled the Australian Army Nursing Service, and in each State was a Principal Matron. For some years a small cadre of nurses had been main-

tained, to whom £1 per year was paid, apparently as a retainer. General Downes had this vote transferred to the more useful purpose of assisting the administration of the Voluntary Aid Detachments, which were officially recognised in the A.A.M.C.

This organisation followed the British model, a body recognised under the Geneva Convention as neutral in time of war, since its function is assisting in the care of sick and wounded. In Australia detachments of both men and women were trained in first aid and the elements of hygiene and home nursing by the Order of St. John, the Australian Red Cross Society or an approved Ambulance Association. As no other provision was then made for women in the Services the suggestion was made at this time that physiotherapists and certain other specialists might be regarded as a special variety of voluntary aid; a remarkable evasion of an obviously coming problem. After the Munich crisis in 1938 the Australian Red Cross Society also prepared plans for the mobilisation of all Red Cross services in emergency.

Some coordination of the A.A.M.C. training was effected by the compilation of handbooks of training and instruction, mainly derived from or based upon R.A.M.C. manuals. Though much of this literature was still based on the experiences of the 1914-1918 war, and some was frankly outdated, attempts were made to bring the professional sections up-to-date. The *Manual of Injuries and Diseases of War* for example, published in Britain in 1918, was by permission of the War Office, reprinted with alterations and additions by British and Australian physicians and surgeons. This was ready for distribution in October 1939.

Steps had also been taken to set down on paper the army administrative procedures. A complete account was compiled by Christie showing what steps mobilisation would entail in the A.A.M.C.; this included descriptions of arrangements for hospital treatment, transport, accommodation, medical enlistment boards, equipment, issue of stores, calling up medical, dental, nursing and other technical staffs, location of stores and training depots, outlines of units and tabulations of war equipment tables.

CONCLUSION

Reviewing the story of the medical services during the period 1919 to 1939 it will be noticed that certain objectives were reached, but others were not. In spite of repeated efforts amalgamation of the medical arms of the three Services was never achieved, not even at a high level. This was not desired by all the medical services, and in spite of the powerful pressure of a faction within the army which earnestly believed that this was a teaching of the 1914-1918 war, and even despite ministerial approval, it was never consummated. Indeed, the half-hearted taking of the R.A.A.F. medical service under the wing of the D.G.M.S. of the Army, a procedure far removed from the original intentions, was not a success. Examination of the debating and manoeuvring of these years shows that a united lead given by the heads of the medical services of the armed forces was often of great value. This foreshadowed the value

of this practical alliance in coordination, as the war years afterwards testified.

Coordination of men and material for the purposes of the medical services, including the civilian, was achieved at last, and hardly needs a prophet to foresee its advantage under the threat of war and still more during war. The long delays in consummating this orderly and economical organisation were largely due to differences of opinion as to who should wield the power, but the spur of danger provided the necessary stimulus. The introduction of these methods showed too how the value of men and women with technical training is paramount in war, provided they are correctly placed. This emphasised the fact that technical training, in medicine and surgery for instance, may be of more or less general kind and may also be highly specialised. The technical advances of the generation between the two wars were so remarkable that each service needed peculiarly specific guidance. Perhaps the branching out of service medicine in different directions in itself made even the most earnest advocates of high level coordination chary of amalgamation, though there may still be possibilities at the highest level.

The importance of another variety of medical coordination could also be seen during this twenty-five year period, the achieving of a stronger technical linkage between the medical services of Australia and those of the other members of the British Commonwealth of Nations. This theme reappears from time to time through the story which is to be told.

The year 1939 thus found the medical services with a high status in the military scheme, and with an important task ahead, that of applying their knowledge and organisation to the cause of national defence. On Sunday, 3rd September 1939 Australians knew finally that they were committed to another great war, and having studied some of the preparations of services now assuming a great responsibility we must place ourselves in the position of an audience which has seen the prologue, and awaits the rising of the curtain on the drama.

APPENDIX

Questionnaire circulated by direction of Central Coordination Committee at meeting of 7th-8th September 1938.

The completion of this form entails no liability to service.

All information contained herein will be treated as strictly confidential.

1. Surname (block letters)
2. Christian name (block letters)
3. Address
4. Age
5. Married, single, or widower
6. Number of persons financially dependent on you
7. Degrees with dates
8. Appointments, hospital, etc.
 past
- present
9. Are you in active practice?

10. What is (or was) your branch of practice?.....
11. If not already a member of a Defence Medical Service:
 - A. Are you prepared to enrol in the A.A.M.C. Reserve now?.....
 - B. In the event of war within Australia are you willing:
 1. To serve with the R.A.N. Medical Service, A.A.M.C. or R.A.A.F. Medical Service attached to fighting units? (only applicable if you are not over 40 years of age)
 2. To serve with the A.A.M.C. in a hospital or other base unit?
12. Whether a member of a Defence Medical Service or not, in the event of war within Australia:
 - A. In addition to your own work are you willing to:
 1. Serve in a public hospital in your own district
 2. Act as *locum tenens* for a service doctor
 - B. Give full-time medical attention to the civil population anywhere required, satisfactory arrangements being made as to payment

CHAPTER 2

ON THE OUTBREAK OF WAR

WHEN Germany invaded Poland on 1st September 1939 there were still people who imagined peace might be preserved, but on the evening of Sunday 3rd September, Australian time, their hopes were dissipated. Great Britain was at war with Germany, and consequentially Australia was now involved in hostilities.

In the medical services the effects of immediate mobilisation were most striking in the navy, for naval reservists were needed at once for both sea-going and shore establishments. During the early weeks of this period the resources of the naval depots of the capital cities were strained to supply enough accommodation and medical officers to carry out the examination of the large number of reservists. In the army large numbers of militia medical officers were called up, chiefly on a part-time basis. Major-General Downes, the D.G.M.S., though hurriedly recalled from his tour of military establishments overseas, had not returned to Australia when war was declared. Meanwhile Colonel W. W. S. Johnston was acting in his stead with Major E. L. Cooper as his assistant.

The air force at once appreciated that great expansion must occur in this service, and that medical commitments would call for a vast increase in organisation. Never happy in its unwilling compliance with control by the D.G.M.S. of the Army, the R.A.A.F. medical services felt that the complex and individual technical nature of wartime duties demanded independence. The absence of Downes from Australia intensified their difficulty, and on 4th September 1939 the Air Member for Personnel took action, and requested the Chief of Air Staff to have the existing system of control of air force medical services reviewed.

RAISING AN EXPEDITIONARY FORCE

On 8th September the Australian Cabinet received word from the Dominion Office in London that the British Chiefs of Staff hoped that Australia might decide to send an expeditionary force overseas. Memories of the bitter controversy in 1917 over conscription were not yet dead, and the parliamentary Labour Opposition held strong views against the sending of a force out of Australia. It was claimed that this action would weaken the defence of Australia and lead the way to compulsory service again. New Zealand, less inhibited, decided at once to raise a special military force, and the Australian Government decided on 15th September to raise one division and auxiliary units up to a strength of 20,000 men for service at home or abroad. In addition two drafts of militia were to be formed each of 40,000 men. This was only 40 per cent of the full mobilisation strength of four infantry divisions, two cavalry divisions, and three independent infantry brigades. It was of course obvious that the obligations of the Royal Australian Navy might range over a wider field

than those of an expeditionary force. The need of aircrews for special service overseas was also recognised by the Government.

On 13th October, Sir Thomas Blamey was appointed as commander of the special force and promoted Lieut-General. Medical examination of recruits began early in October. On 3rd October General Downes arrived in Australia, having perforce curtailed his tour of the American continent to a few days. On resuming duty under the increasing pressure of urgent mobilisation requirements he was perturbed by a certain slowness of response of medical officers for duties in the new force. The reasons for this are of some importance, for a perceptible degree of cleavage was apparent between the militia and the special force, soon to be known as the 6th Division of the Second A.I.F. (Australian Imperial Force). The Cabinet had decided that preference was to be given to the militia for enlistment in the A.I.F., half the vacancies to go to the militia, a quarter to men who had had previous service, and a quarter to men from the country who had not had opportunity for training.

The 16th Brigade was recruited largely from New South Wales; after the first three days the flow of recruits slackened, and of 3,400 who had been accepted up to 13th October, only 1,200 had come from the militia. Only at the end of November was the 16th Brigade up to 96 per cent of full strength. The reasons for this were stated by Blamey to be a lack of inspiring lead by the Government, hesitation of militiamen to join a force which seemed unlikely to go overseas, and active or passive resistance to recruiting by militia commanders. The last reason was probably exaggerated, but there was no doubt some basis of fact behind it. It is only fair to add that the rates of pay for members of the expeditionary force were below those given the militia, an anomaly only corrected when the force went overseas. On 15th November compulsory training for home service was announced by Mr R. G. Menzies, the Prime Minister, and on 28th November the decision was made to send the division abroad early in 1940.

In this early period of indecision arose a feeling of separation between the militia and the A.I.F. which was to persist in diminishing degree throughout the war, and which was to some extent noticeable in the medical services. Though there was on the whole no difficulty in obtaining medical officers for the new division, some hesitation was discernible among the younger specialist groups, who perhaps not unnaturally waited to see what were the prospects of going overseas. There seemed more keenness in the southern than the northern States, perhaps because of the personal influence of the headquarters of the three medical services in Melbourne.

MEDICAL UNITS

The medical units raised with the Second A.I.F. were, like combatant units, given continuity with the original A.I.F. units by using the prefix "second", abbreviated as the 2/1st Field Ambulance *et cetera*.¹ Their

¹ In the beginning this prefix was not officially used for such units as general hospitals or for units which had not exact counterpart in the First A.I.F. As the term "second" was generally used for A.I.F. units later, no distinction based on chronology will be used.

colour patches also had a distinctive grey background, and their members carried a bronze badge "Australia" on each shoulder. The units raised with the 16th Brigade were the 2/1st Australian General Hospital, the 2/1st Field Ambulance, and the 2/1st Field Hygiene Section. The hospital unit was not completely assembled till near the time of embarkation, as the more senior officers, particularly the specialists were not then needed. Difficulty was found in recruiting privates for the Army Medical Corps, and in the last week or two there were men who marched in with a certain air of surprise to find themselves in a medical unit. Non-commissioned officers, when not technical specialists were in many instances experienced in militia work and invaluable for their knowledge of procedure.

No difficulty whatever was found in recruiting nurses for the hospital. Owing to scarcity of accommodation, which was in most camps used by the Second A.I.F. in these early stages, occupied by militia troops, the assembly of these units was hurried into the last few weeks before embarkation. Clothing and equipment which had been lamentably short in supply began to come to hand, and at the end of the year most of the preliminary preparations for departure were well in hand.

ADVANCE PARTY OF THE A.I.F. GOES OVERSEAS

On 15th December an advance party of the Second A.I.F. left for an overseas base. This party included Colonel H. C. Disher, who like most of the senior medical officers volunteering for the special force, had served in the 1914-1918 war: he was to be the Assistant Director of Medical Services of the Overseas Base, and his deputy was Major N. H. W. Saxby, who had field training with the militia. The destination of the force was officially undisclosed but by the end of the year it was generally known or assumed that the division was bound for the Middle East, as a training ground for operations in Western Europe. The demands for medical services in Australia grew rapidly: the militia camps had to be served, the coastal defences had their medical problems, medical examination of recruits needed many doctors, and administrative duties called for many more in headquarters and in medical units.

Full powers were not as yet available to the Central and State Coordination Committees for the control of medical personnel, accommodation and equipment, but as yet there was no urgent need for more authority, as the State committees could render any necessary help in consultation or action.

D.G.M.S. RETURNS

A month after the declaration of war Downes arrived from his overseas trip with much useful information. During his tour he had conferred with the administrative heads of the armed forces in Britain and in India, and had facilities for studying methods and material, the most efficient forms of treatment in the field, the handling of casualties and medical aspects of passive air defence. He made investigations into ordnance stores such as tentage and uniforms, and into hygiene in the field. Two visits to the French army proved valuable. In spite of the urgent stress of work in

all services help was freely given by all concerned. The declaration of war forced Downes to compress into six days visits to Ottawa, New York, Washington and Chicago, but he recommended that a detailed study of the United States Army equipment and book-keeping method would be most useful. In Europe he gathered valuable information concerning motor ambulances, particularly of the Indian type, methods of water carriage and purification, disinfestation, details of field medical and hygiene equipment, types of suitable containers for these, preventive inoculation, technical training and air transport of casualties. He noted particularly the value of adequate secretarial staff. Recalling the previous discussions about the relationship of the Director-General of Medical Services with the Adjutant-General and the Military Board, Downes also investigated this question overseas, and concluded that it was not desirable that the director should be a member of the controlling body, but that it was essential that he be consulted and have ready access to it. It is interesting that he found a considerable divergence of opinion concerning the surgical functions of a field ambulance. It will be seen later that combat experience called forth similar discussions in the field and at headquarters. British medical equipment was found to be of great interest to Australia; the desirability of a degree of standardisation was evident, and also the need for alternative sources of supply to be open to Australia for items which were not made there. Some useful details of dental equipment were obtained and information relating to dental establishments and administration.

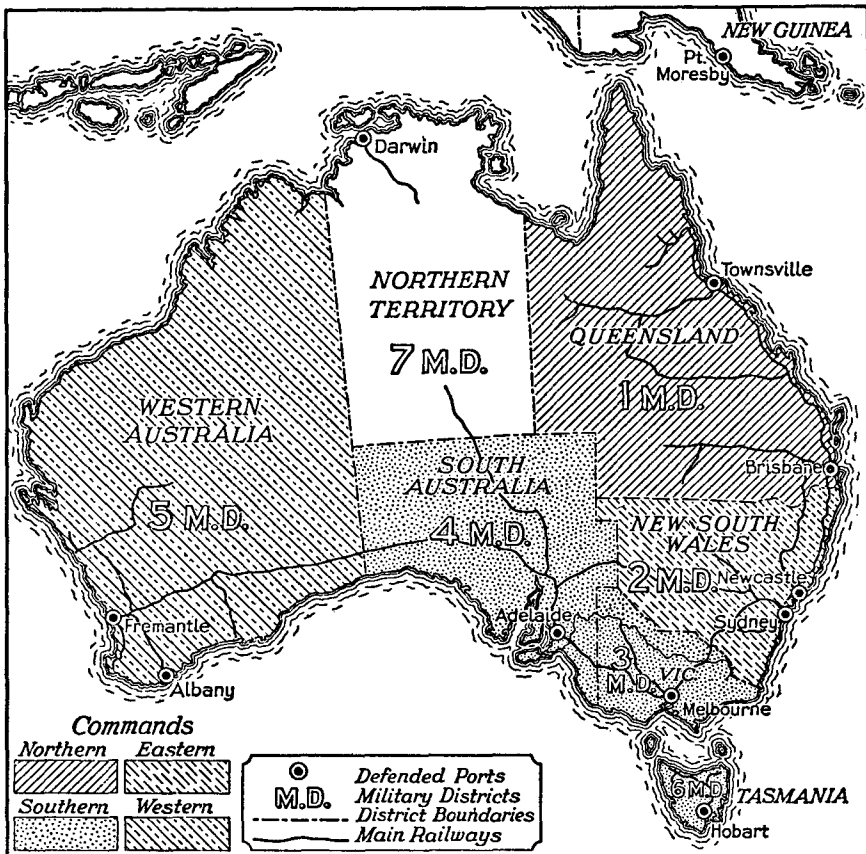
Downes was impressed by the rapid expansion of aviation medicine in Britain, which called for a closer liaison between the R.A.F. and the R.A.A.F. The Director of the Medical Services of the R.A.F. strongly urged that the attachment of a medical officer of the R.A.A.F. to the R.A.F. medical branch which had been most successfully effected with one Australian officer, Wing Commander E. A. Daley, should be continued year by year.

A visit to the medical establishments of the German army and air force had been arranged, together with interviews with Goering and Ribbentrop, but the German authorities abruptly cancelled these at the beginning of August. Two other subjects in which Downes was particularly interested were preventive inoculation of troops and radiographic examination of recruits. The results of these enquiries were most useful on his return, particularly as important advances in the latter had been made in Australia during his absence.

MILITARY ORGANISATION IN AUSTRALIA

Many urgent problems awaited the D.G.M.S. on his return, and it was a pity that the delays in obtaining approval and finance for this tour considerably reduced its value. The change from peacetime establishments to the needs of war involved many adjustments and changes. In August 1939 provision was made for the medical requirements of two cavalry divisions, five infantry divisions and fortress defence troops. On a militia

part-time basis there was the skeleton staff for six cavalry field ambulances, fifteen field ambulances, seven field hygiene sections, eight fortress companies (A.A.M.C.) and, a recent addition obtained against opposition, two casualty clearing stations. Establishments provided for regimental medical officers and orderlies. The latter had previously not been members of the medical services, but this curious anomaly was remedied. These units were distributed among the six military districts, whose boundaries corresponded approximately to those of the States; a seventh military district embraced the Northern Territory. Early in October the Military Board introduced the command organisation in lieu of the previous system. Northern and Eastern Commands now replaced the 1st and 2nd Military



Commands and Military Districts.

Districts (Queensland and New South Wales) Southern Command absorbed the 3rd, 4th and 6th Military Districts of Victoria, South Australia and Tasmania, and the 5th District became Western Command. Downes made a last minute protest against this change, fearing that it

might now be possible for technical recommendations to reach the Military Board without the D.D.M.S. of a command being consulted, but this seemed to be very unlikely.

Under the militia establishments no provision was made for units such as hospitals, convalescent depots and training depots; these were now required, calling for more staff and equipment, in addition to the requirements of the existing field medical units. The special force of one division needed 104 medical officers, including three colonels, two to command hospitals and one as A.D.M.S. Preliminary arrangements had been made for the supply of medical staff for the defence forces and the special force, but following the practice of 1914, all decisions about appointments were left to the D.G.M.S. There was little time left for the completion of arrangements for the 16th Brigade which was due to embark early in the new year. The medical tasks to be carried out involved special decisions and arrangements. Physical standards for the special force conformed closely with those current on the outbreak of war, but details needed confirmation, and the question of radiological examination had to be settled at once and steps taken to select and supply apparatus, and to adopt methods of procedure and review. The details of immunisation were also decided and standards laid down. Finally, though major questions of equipment were still to be settled for the medical units, especially the large ones, casualty clearing stations and hospitals, there were a 600 bed hospital and a convalescent depot to be equipped by the new year, as well as a field hygiene section and a field ambulance, and the regimental medical officers.

In these matters the preparatory work done before the declaration of war proved most useful, and the principles laid down in Standing Orders for Mobilisation, and the Army Headquarters Instruction for War proved adequate guides for procedures.

At the outbreak of war the staff of the Army Medical Directorate included three permanent officers, the D.G.M.S. and two non-medical staff officers, Major Christie and Lieutenant F. C. Barnet, a civilian clerk, and several militia officers who were available for part-time duty, nominally up to sixteen days *per annum*. These included two assistants to the D.G.M.S. (Colonel W. W. S. Johnston and Major E. L. Cooper), a Director of Hygiene (Lieut-Colonel C. H. Kellaway), a Director of Dental Services (Lieut-Colonel J. E. Down), a staff officer of Pharmaceutical Services (Major C. Tonkin), and a Matron-in-Chief (Miss Grace Wilson). The A.D.G.M.S. and his deputy and the Matron-in-Chief at once came on full-time duty. Expansion of the organisation began along the lines of the British War Office Directorate, in which separate sub-directorates are responsible for personnel; medical standards, accommodation, and treatment; equipment; nursing; hygiene and pathology; organisation, and medical and surgical treatment. The developments at the medical headquarters will be detailed later.

Meanwhile a medical administrator for the 6th Division, Colonel S. R. Burston, was selected as A.D.M.S., an officer with an excellent record in

the 1914-1918 war when he had held senior appointments, and with an unbroken sequence of militia experience in South Australia. Downes had made preliminary arrangements while in London to select consultants for an expeditionary force, should the need arise; as a result, this foresight secured the services of Sir Thomas Dunhill as Consulting Surgeon and Dr N. Hamilton Fairley as Consulting Physician. These distinguished Australians rendered valuable services in London as technical advisers in the early stages of the war, and their choice was a fortunate one for Australian medicine. A medical liaison officer was also appointed in London, Major H. M. Trethowan, who took up duty as the A.A.M.C. representative at Australia House. He reported all new developments and helped to place orders for equipment in England, and was able to visit the British Expeditionary Force in France and investigate matters of interest to the A.A.M.C. His reports covered such topics as equipment, establishments, technical details of blood banks and the supply of serum and plasma, details of medical embarkations, hospital ships and ambulance trains, records, and special subjects like X-ray apparatus and prophylaxis and treatment of venereal disease.

MEDICAL EXAMINATION OF RECRUITS

Criticism of medical examinations for the militia had been voiced in the Federal Parliament in 1936, when the whole system was also criticised. The Military Board agreed with the adverse comments on the system as carried out at that time, but had no option but to continue as before. No relaxation of medical standards had been authorised, but it was believed that medical officers interpreted the standards more leniently. As a "screening" test the average examination for militia men was very rough indeed. The circumstances were against greater accuracy, as examinations were often perforce carried out by busy practitioners under the handicap of poor facilities and numbers too great to be examined in the time available.

In 1938 the subject was reawakened. The annual Anne Mackenzie oration delivered by Major-General Downes in March 1938 at Canberra contained apposite references to health standards in connection with military service, and in April further references were made in the Melbourne Press to Australian physical standards. The generally low standard of dental fitness was the subject of special comment; for instance it was pointed out that nearly 15 per cent of the applicants for the permanent forces were dentally below standard. The value of physical exercise for youths was also mentioned, particularly in the form of games with recreational appeal. It was pointed out on behalf of the armed forces that the high standard required for entrants to the permanent Services caused the rejection of many men who did not satisfy these standards though they were in all other respects physically fit. The rejection figures for the permanent forces were then given as navy 45 per cent, army 55 per cent and air force 43 per cent, whereas less than 4 per cent of volunteers for the militia were rejected.

In June 1938 fresh interest was aroused by General Sir Harry Chauvel who expressed disappointment in the physique of some of the men taking part in the march on the occasion of the King's parade. Some discussion was evoked and contrary opinions were expressed on behalf of the militia and the air force. It was pointed out that many of these were youths whose physique was as yet immature though sound, and that slenderness was no indication of capacity.

In 1939 these questions of standards of development and physique became pressing when applied to a volunteer force likely to serve overseas, a successor to the still famous A.I.F. of the previous generation. The compulsory calling-up of the militia emphasised the importance of the physical examination and selection of men for the armed Services. The number of rejections for militia services was greater under a compulsory system, but this was due not so much to a more exacting standard of examination as to the inclusion of numbers of defectives who were automatically included in the yearly quota called up for examination for the militia. In general, it is fair criticism to state that the primary recruiting medical examinations were carried out under very unfavourable conditions, in pursuance of a policy that was penny wise and pound foolish. It is interesting that a letter from a layman describing conditions in at least one recruiting medical examination room as "revolting" was published in *The Medical Journal of Australia* on 30th August 1941. Though it was evident that accommodation was poor and restricted in the early days, it was futile to expect the medical services to carry out such an important function without proper facilities. Good accommodation, reasonably free from noise, where men could be examined deliberately and with adequate equipment, was essential. Competent senior practitioners appointed to organise and oversee the work were needed in greater numbers: later, some of the best work was done by men of the semi-retired class. More will be said later of the defects responsible for the breaking down of recruits under training. Certainly there were examples of hurried work, lacking in thoroughness, but not a little of this was primarily due to unreasonable expectation that good work can be done with poor facilities.

In 1939 and the early part of 1940 great numbers of recruit examinations were carried out by part-time medical officers in such time as could be spared from the demands of general practice. This examination was only preliminary, and a second examination was carried out in the larger centres by a board which had important functions. Such a recruiting board could work quickly by sub-dividing the work; it had an opportunity of disclosing defects not previously obvious to a single examiner, and it could make decisions in doubtful cases. This board of review was later reinforced by the greater use of consultants, in such branches as orthopaedics, skin and the special senses. Re-examination also helped to unmask impersonations. That impersonation took place seems certain. Later, when the check examinations were better arranged, and when X-ray examination of the chest was done at the time there was little chance of this deplorable

practice succeeding. Eventually a photograph was taken of all members of the forces, but in the early period of war most of the troops had embarked for oversea service before their photographs could be taken. If this could be done at the time of the second board all problems of identification would be solved. Finger printing has been suggested and would seem to be practicable and desirable.

The AAF D1, the important document which records the result of medical tests of every recruit, contains a *questionnaire* designed to cover his past medical history. This was soon found to be inadequate and questions were added relating to head injuries and digestive disorders, in view of the frequency of the appearance of men on sick parade complaining of symptoms due to these conditions, though they had previously denied them on enlistment. This part of the D1 was too often filled out by a non-experienced lay clerk, instead of by the medical examiner, and the recruit was not always made to appreciate the seriousness of the offence of mis-statement. It seems a pity that action was not taken under the *Defence Act* against some of the offenders. Many medical examiners look tolerantly on the misguided patriotism which urges recruits to understate their age, or even to omit important items in their history, but the principle is wrong. Ample time for the taking of a history should be allowed in these examinations; part of this time would be usefully spent in forming at least some partial mental or psychiatric estimate of the man's suitability. The question of special psychological and psychiatric examination of men and women enlisting for various types of service in time of war will be dealt with later. The effect of the induction of unsuitables in an army needs no detailed description; it lowers general morale, increases sick wastage and adds to useless national expense in medical care and pensions.

The standards at first laid down for the Second A.I.F. were as follows:

Two classes of fit men were accepted. Class I included two categories (a) those fit for duty in the special force, (b) those fit for duty in field formations. Class II included those (a) fit for specified duties in any unit in which the disability is no bar, and (b) fit for duty other than with field formations.

Age: between 20 and 35 years, the upper limit being extended to 40 years for potential warrant and non-commissioned officers. The age limits for officers were lieutenant 30 years, captain 35, major 40 and lieutenant-colonel 45 years. Height: 5 feet 6 inches as an ideal, 5 feet 5 inches to be admissible in special cases. Recruits of 5 feet 4 inches in height could be listed for consideration; 5 feet 2 inches with chest measurement of 32 inches would qualify for class II.

Chest measurement: 35 inches maximum was accepted.

Eyesight: Class I (a) 6/18 both eyes; (b) 6/12 one eye, 6/36 the other. Class II (a) 6/24 both eyes; (b) 6/18 one eye, 6/60 the other.

Hearing: Whispered speech heard at 20 feet was required; a lower standard in one ear could qualify for certain service. Ordinary speech

heard at 20 feet in one or both ears was sufficient for the class II categories (a) and (b) respectively.

There was no fixed standard of dental fitness. Provided a recruit had jaws which lent themselves to the fitting of effective dentures he was not rejected for dental deficiency. Men with dentures were accepted. Any recruit rejected for dental reasons was rejected only by advice of a dental officer, who certified his reasons on the AAF D1. For the purposes of the preliminary examination a recruit could be accepted with a few teeth in good occlusion.

These standards were exacting in respect of the minima of height, chest measurement, eyesight and hearing. Inevitably changes were made in the direction of relaxing these criteria. The second examination revealed that numbers of men were accepted on the preliminary test who were too short to comply with the standard. Directions were circulated among medical officers setting out the standards required, and giving details of conditions calling for special care and judgment, but the interpretation of these varied considerably.

Skeletal deformities needed specific and careful examination. The feet demanded special attention, but stress was chiefly laid on functional capacity. Hernia and varicose veins were also important. Exercise tolerance tests were not used as a routine, but where the efficiency of the heart was questioned some form of this method was advised.

Early in 1940 an amended schedule of the procedure adopted in recruiting examination was published. Some of this may be quoted here, as the advice given therein applied equally to the original routines. Attention was directed particularly to the detection of any of the following abnormalities, which were recorded in detail if discovered:

Defects of the heart, lungs, or circulation; insufficient muscular development; postural deformities of chest and spine; deformities of limbs—especially of hands and feet (bunions, hammer toes, *pes cavus*, flat feet and missing digits); corns on toes; limitation of movement of joints; mental deficiency; hernia; defects of speech or hearing; haemorrhoids; varicose veins of appreciable degree; goitre; adiposity; renal disease; diabetes; infectious skin disease; trachoma; peptic ulcer; apparently above age limit for enlistment.

Certain conditions were found likely to raise doubts in the examiner's mind, and the following advice was given as a guide to a decision:

(a) Absence of fingers.—Loss of one finger or portions of two (except of index and middle right fingers) will not unfit a recruit for class I, if other hand movements be normal.

(b) Undescended testis.—Not to be regarded as disqualifying.

(c) Hernia.—Disqualifies for class I and IIB. Not disqualifying for class IIA unless large or causing pain.

(d) Hydrocele.—A large hydrocele should cause temporary rejection until treated by operation.

(e) Varicocele.—Not to be regarded as disqualifying unless associated with pain.

(f) Kyphosis.—The postural type does not disqualify but if the angulation is acute, the recruit must be rejected.

- (g) Scoliosis.—Slight degree (especially of “postural type”) not to disqualify.
- (h) Flat feet.—Only disqualifying in severe and undoubted cases. If the arch, while not apparent on standing flat, appears on standing on tiptoes, the candidate is acceptable. If it does not appear and if the feet are free of marked deformity or tenderness, he may be accepted for class II.
- (i) *Pes Cavus*.—Excludes for class I. If present to a moderate degree the candidate is acceptable for class IIA and B.
- (j) *Hallux valgus* (or bunion).—Will disqualify if associated with other deformities of the feet or with painful or disabling corns.
- (k) Hammer toes.—If associated with corns will disqualify for class I; not to disqualify for class II unless corns are inflamed.
- (l) Blood pressure.—A systolic blood pressure above 160 mm. mercury or a diastolic blood pressure above 100 mm. mercury renders a recruit unfit for classes I and II. A diastolic blood pressure over 90 mm. mercury is sufficient to exclude a recruit under 40 years of age for class I. An applicant over 45 years of age with a diastolic blood pressure between 95 mm. and 100 mm. mercury should be accepted only if the urine is free of albumin. Low blood pressure alone does not exclude.
- (m) Cardiac murmurs.—Care is to be taken that systolic murmurs unaccompanied by symptoms or signs of cardiac disease, and so of no clinical significance, are not regarded as disqualifying. A definite history of coronary occlusion excludes for all other duties except those of a sedentary nature on home service.
- (n) Tachycardia.—Is not necessarily evidence of heart disease, but a consistently rapid pulse at successive examinations should be viewed with suspicion.
- (o) Cardiac irregularities.—Are of no significance unless they persist when pulse rate rises as a result of exercise.
- (p) Asthma.—Recruits with a history of asthma should be rejected if they have had attacks in the immediately preceding five (5) years.
- (q) Pulmonary tuberculosis.—A definite diagnosis of tuberculosis past or present, or pleural effusion (unless definitely non-tubercular) will disqualify.
- (r) Glycosuria.—Will disqualify unless a sugar tolerance curve within normal limits is obtained.
- (s) Albuminuria.—Albuminuria in a youth is of no pathological significance unless it is associated with other evidence of disease. If the presence of albumin be detected by the test of boiling with dilute acetic acid, further examinations should be made after an hour's rest in the recumbent position, or at different times of the day. If the urine be then clear, the candidate is to be considered fit. When an appreciable amount of albumin is present in the specimen passed after lying down, the candidate will only be accepted if in addition to the above conditions microscopic examination fails to show red or white corpuscles.
- (t) Peptic ulcer.—A definite history of peptic ulcer will disqualify for the A.I.F. A recruit may be accepted as class II for home service only provided he has been free of symptoms for two years.
- (u) A history of certifiable mental derangement will disqualify.

Particular care was enjoined in the carrying out of tests of sight and hearing, which were the personal responsibility of the medical officer.

Difficulty arose sometimes in deciding the significance of glycosuria. The instruction allowed acceptance provided the sugar tolerance curve of the blood was within normal limits. The difficulty lay in determining what constituted a normal curve. At first anyone with sugar in the urine was rejected, but later the resources of laboratories were used to have blood tests made. Later still the development of military laboratories and availability of more pathologists and biochemists permitted routine

examination of these men. Some of the curves obtained showed higher swings of sugar content than are usually accepted as normal, and when the need for men became great and these men were accepted, serial examination usually failed to reveal evidence of diabetes, or even of abnormal blood analyses. Suspicion was at one time entertained that some interference was being practised with the normal mechanism of sugar absorption and excretion by men seeking to avoid military duty, but experience dispelled such ideas. A special investigation in Melbourne showed that occasional glycosuria with slightly aberrant tolerance curves were found among as many recruits for the A.I.F. as among those called up for the militia. It seemed likely that the common factor was neuro-genic, and due to psychological causes. Observations in Sydney and elsewhere yielded similar results.

An occasional cause of confusion was in the examination of the heart. Some medical examiners, especially when working under the spur of haste and in noisy uncomfortable surroundings, rejected young men as suffering from mitral stenosis. In a number of these there was only a cardio-respiratory murmur associated with overaction of the heart under excitement, and with an apical impulse deceptively forceful and diffuse. On the whole, however, the bar to accurate examination was not one of knowledge or judgment, but lack of time and facilities for carrying out a methodical and deliberate examination in which all necessary observations of structure and function were made.

For medical officers the limits of age were often exceeded. At that stage it might have been difficult to staff a general hospital had age limits been strictly observed. For the positions of senior specialists considerable experience was desirable, especially at a time when standards in military medicine had to be established, and with this in view the more senior age groups were drawn upon freely. At this time too, volunteers for medical service contained rather a disproportionate number of senior men and especially medical officers who had served in the 1914-1918 war.

General Downes in March 1940 expressed the opinion to the Adjutant-General that it was a mistake to send men of class II away overseas, as many of them broke down. But the breakdowns were not only coming from class II men but also from class I. Inspectors of recruit examiners had been appointed in each State, lectures were given setting forth the requirements of a correct and full examination routine, and instructions sent out to all concerned. Later Lieut-Colonel H. H. Turnbull acting as inspector on behalf of Army Medical Headquarters investigated the not infrequent complaints of inefficient examinations. In spite of the impersonations and deceit which had been the cause of some errors, there was no doubt some foundation for complaint. As has been previously pointed out, omissions and false statements in the AAF D1 still accounted for many errors and it was considered that the fault lay with the medical examiners in less than half the cases. Some gross errors occurred in examination of the eyes and the employment of an oculist was recommended. It was also found desirable that an aurist should be available to

assess men who had old perforations of the ear drums. Though numbers of men of class II type (later known as B class) complained of symptoms from minor disabilities which had originally placed them in the lower category and eventually were returned from overseas, there were others in class I who managed to carry disabilities past several medical examiners. There can be little doubt that the second medical board was of the greatest value, especially when it was well organised, with the duties divided between the two members of the board according to their special interests and knowledge. A suggestion was made at this time that the original medical examination should simply grade recruits into two classes fit or unfit for military service, and that the grading be done by the second board, but this was not adopted.

RADIOGRAPHIC EXAMINATION OF THE CHEST

The most important innovation in the methods of selection of recruits for the A.I.F. in 1939 was the adoption of radiography of the chest. The actual method used was that of miniature fluorography, in which a photograph of the image on a bright fluoroscopic screen is taken on a 35 millimetre film. Dr H. W. Wunderly suggested in April 1939 the possible value of this method for large scale surveys. Successful X-ray examinations were made of the 16th Brigade Group before embarkation in January 1940. Though the recommendation from the D.G.M.S. was only approved by the Minister for Defence in November 1939, and it was the 24th December before the apparatus could be built and tested, even an accident to it *en route* did not prevent its rapid replacement, and the radiographic examination of 6,775 men was accomplished by 9th January. Cost was greatly reduced by this method. In the first two months of the application of micro-fluorography 22,000 men were examined at a cost of about fourpence per man. Even when allowance was made later for costs of travel, maintenance and depreciation the cost did not exceed tenpence per individual. It is hard to understand why permission to apply this method to men called up for the militia was withheld till 1942. The reason appears to have been financial, but against cost must be put the much greater cost of treatment and after care of men who could claim that an early pulmonary lesion had been exacerbated by military service.

Some radiologists hesitated to give the method their unqualified approval, but criticism was due largely to false assumptions. The difficulty in assessing the significance of apparently abnormal shadows in a miniature film were admitted, even when a board of two radiologists and a physician skilled in thoracic medicine examined the films enlarged on a screen. Care was taken that no board worked too long, to obviate fatigue. Their decision was merely "accept" or "for large film", and where any doubt existed a 17" x 14" film was taken and reviewed. If shadows suspicious of a pulmonary lesion were then seen the verdict was "reject". No recruit was rejected on the evidence of a miniature film alone. Experience showed that with safeguards the method was both accurate and rapid, and opposition on technical grounds disappeared. The use of

micro-fluorography quickly spread to the navy and air force and the women's services. Eventually a film was also taken of the chest of every man and woman entering and being demobilised from the Services. The changes brought by the introduction of mass surveys for tuberculosis have been notable. Indeed the problem of the handling of sufferers from early pulmonary tuberculosis has since the war become one of practical politics. Before the war, calculations of hospital and clinical accommodation were based to some extent upon the mortality figures or those for gross morbidity. Since the war, rates of incidence have become all important as the result of comprehensive surveys. There can be no doubt that the significance of tuberculosis in a community emphasised for so long by the medical profession, though largely in vain, has now been made evident to the people and their political leaders largely through the application of this specialised technique to military hygiene.

BLOOD GROUPING

Another important innovation was the introduction of blood grouping tests on every recruit. On the advice of the experts in blood transfusion Downes recommended its adoption to the Military Board. There was never any question of the wisdom of this measure, but some hesitation was felt at first in making it compulsory, on the curious ground that some men might object to having blood taken. Naturally this argument did not prevail. With the help of pathologists in civil hospitals in the capital cities the work was done with admirable despatch and accuracy. Later routine checks overseas and experience in medical units proved that reliance could be placed on this important item in a recruit's official record. Cross typing was always done if possible, but where this could not be done in emergency no complications occurred due to inaccurate typing. Each soldier's blood group was recorded in his paybook and stamped on his identity disc, though in the rush of departure not all discs were stamped in the units of the 16th Brigade.

PREVENTIVE INOCULATION

The whole question of preventive inoculation had been in the mind of the D.G.M.S. for some time before the outbreak of war. He realised that not only the question of immunity was involved, but also that of reactions following injections of vaccines or toxoids. The administration of repeated injections to troops was not only to some degree unpleasant, but consumed considerable time, and interfered with training, especially when uncomfortable side effects occurred. During his trip abroad Downes had investigated the possibility of using "cocktail" vaccines containing antigens of the enteric group and tetanus toxoid. On his return to Australia his advisers, Colonel Kellaway and Dr Morgan and his staff at the Commonwealth Serum Laboratories warned that investigation and trial were necessary before using a compound inoculation owing to the risk of severe reactions. Sharp reactions were known to follow "T.A.B." vaccine, which protected against typhoid and the A and B varieties of paratyphoid

fever. Investigations were carried out later on volunteers, but these did not encourage the use of combined vaccines and toxoid, as some excessive reactions were encountered. The advisability of building up immunity to tetanus was undoubted, and a formalinised toxoid was chosen for this inoculation. Even if Australian soldiers were not to be exposed again to the risk of highly contaminated soil, as in some of the intensively tilled areas of Western Europe, the serious nature of the disease called for protection. The advisability of adding dysentery and cholera antigens to the enteric vaccine was also considered, but it was thought better to consider inoculation against other alimentary tract infections when such a need appeared.

The routines adopted then were the administration of "T.A.B." vaccine at weekly intervals in three doses of 0.25 c.cm., 0.5 c.cm. and 0.5 c.cm., and of tetanus toxoid in a dose of 1 c.cm., repeated in six weeks. In order to avoid undue local and general reactions and to obviate the prejudice existing against these injections and their side effects, the usual full dose of the vaccine was halved. It was clearly realised at the time that there was no certainty that a solid immunity would be conferred by these doses, and after the first convoy had sailed experiments were carried out to ascertain what concentration of antibodies in the blood could be produced by the smaller doses. When compared with the results of British workers on the effects of the vaccine used by the British Army (Maclean and Holt, *Lancet*, 9th November 1940) the results were not very satisfactory. Even so, reactions occurred not infrequently, though it was found sufficient to free men from physical exertion till the following day. As told elsewhere completely new arrangements for preparation of a strongly antigenic but relatively non-toxic vaccine were made later. It was planned to give a routine *injection de rapelle* every year to every member of the forces. Men in the militia were also inoculated against the enteric diseases, as successive occupation of camp areas by unprotected men constituted a hazard. The D.G.M.S. held that this compulsory inoculation was necessary for militia, University trainees and garrison battalions in camp.

Tetanus toxoid usually produced no reaction following intramuscular injection, but in some series, such as those seen in the 2/2nd Field Ambulance at Puckapunyal in January 1940, up to 25 per cent of the men had some anaphylactic manifestation such as swelling of the face, urticaria, flushing and sweating after the second injection. A few men had vomiting and diarrhoea. Officers of the 2/1st Field Ambulance at Ingleburn in January out of an experience of 1,000 inoculations reported two cases of severe shock with abdominal pain and passing of blood. Recovery followed administration of adrenaline. Similar transient but alarming manifestations were seen in other parts of the world in a very small percentage of inoculated men. The material used was thoroughly examined, and it was concluded that a very small amount of peptone in the inoculum had sensitised susceptible persons. Precautions taken to exclude any such extraneous allergen eliminated the trouble.

In addition to these inoculations all men going overseas were vaccinated against smallpox. Since the majority of Australians are unvaccinated and therefore non-immune, this was necessary, but care was taken to keep within proper limits the amount of virus introduced, so as to minimise local and general reactions and to lower the risk, small though it is, of complications. In mass vaccination the requirements are speed, asepsis and safety. Instructions to medical officers laid down that a single site should be used for insertion of the lymph, strict aseptic precautions be employed in sterilising the applicator (such as a flamed wire loop) and conveying the lymph to the sterilised skin. The area covered by the lymph was not to exceed 3 millimetres. Scarification was forbidden; instead, the skin was repeatedly pressed by the edges of a triangular surgical needle through the drop of lymph. No troubles arose from this method. One interesting observation was made in New South Wales. Local reactions following vaccination occurred less frequently and were less severe when nurses cleansed the men's arms instead of orderlies. This was surely due to the greater thoroughness and experience of those trained in aseptic methods, all the more important here, since no antiseptics could be used, only a neutral detergent such as ether.

THE FIRST CONVOY SAILS

The final preparations for the 16th Brigade Group were more or less completed by the 9th January 1940 when the first units to embark marched on to the waiting transports. Anchoring in Sydney Harbour these ships awaited the remaining ships of the imposing convoy, which under the escort of *Ramillies*, a battleship of the Royal Navy, and the Australian cruisers *Sydney* and *Canberra*, stood out to sea on the early afternoon of 10th January. Arrangements were made to ensure that a relatively senior medical officer was included on the medical staff on each ship, and as far as possible each medical unit sailed together. This permitted intensive training to begin at once, and regular courses in appropriate military and medical subjects were arranged, laying stress on the preventive aspects.

CHAPTER 3

MEDICAL ORGANISATION

I

ORGANISATION OF MEDICAL HEADQUARTERS

AFTER General Downes' return from overseas Colonel Johnston administered the Army Medical Directorate dealing with personnel (A.M.D.1), with Major E. L. Cooper and Captain A. D. Matheson in A.M.D.2 (hospitals and treatment), and Majors E. S. J. King and K. W. Starr, and Captain R. G. de Crespigny in A.M.D.3 (equipment and supplies). Later in 1940 Colonel R. W. Whiston Walsh was brought from Sydney to act as Deputy Director-General of Medical Services and by a process of gradual expansion other directorates were staffed. Some delay occurred in obtaining approval for additional staff, but when the necessary positions were filled the staff of the D.G.M.S. at the headquarters, Melbourne was as follows:

D.G.M.S.—Major-General R. M. Downes.

D.D.G.M.S.—Colonel R. W. Walsh.

A.M.D.1—Lieut-Colonel A. E. Colvin and
Captain Lady W. MacKenzie.

A.M.D.2—Lieut-Colonel W. Evans, Major S. O. Cowen (part-time)
and Captain J. B. D. Galbraith.

A.M.D.3—Captain C. W. Ross, Captain J. C. Stewart.

A.M.D.4—(Matron-in-Chief) Miss Grace Wilson,
later Miss Sinclair Wood.

A.M.D.5—(Hygiene) Lieut-Colonel M. J. Holmes.

A.M.D.6—(Dental) Colonel J. E. Down, later Major L. Harbeck.

A.M.D.7—(Pathology) Colonel C. H. Kellaway.

Consulting Surgeon (part-time)—Colonel Sir Alan Newton.

Consulting Physician (part-time)—Colonel H. H. Turnbull.

S.O.M.S.—Major A. Christie, Captain H. P. Fitzsimons.

Q.M.—Lieutenant F. C. Barnet.

Business Adviser—Mr W. S. Philip.

Chief Clerk—Mr E. H. Ward.

This list is incomplete owing to constant changes as various officers took up duties with the A.I.F.

The appointment of Lady MacKenzie to the headquarters staff was a significant step, as she was the first woman doctor to be commissioned. This innovation was followed by the commissioning of more women in the medical services. Approval was given for the commissioning of women doctors whole-time or part-time for duties connected with recruiting, especially of nurses, and later of members of other women's services. Later numbers of women were employed in special departments of medical units, and for routine duties in base hospitals.

No changes were necessary at this time in the naval medical services except inevitable expansion of staff: and Surgeon-Captain W. J. Carr, the director, continued in this post throughout the war.

THE R.A.A.F. MEDICAL SERVICE BECOMES INDEPENDENT

In the R.A.A.F. a most important change took place in April 1940 when the air force medical service was made independent of the control of the D.G.M.S. of the Army. As told in the previous chapter, prompt representations were made to the Minister for Air (Mr J. V. Fairbairn) by the Chief of Air Staff (Air Chief Marshal Sir Charles Burnett) for the establishment of an independent service. The D.G.M.S. opposed this submission on the grounds that the existing arrangement afforded greater economy of effort and cost, and prevented competition for men and material, and that the R.A.A.F. medical service lacked experience, organisation and skilled assistance.

Burnett pointed out in reply that the rapid expansion of organisation which was then inevitable in air force medical services, and the greater need for technical assistance in the special problems of aviation medicine called for a separate service. The Minister for Air presented War Cabinet Agendum No. 74/40 in which he recommended that the D.G.M.S. of the Army should relinquish control over the R.A.A.F. medical service and that all medical matters requiring coordination should be dealt with by a standing committee of the three permanent Directors of the Medical Services. This was approved by the Cabinet in April 1940 and the air force medical service thereupon became independent. Sir Charles Burnett offered the position of D.G.M.S. of the R.A.A.F. to Colonel T. E. V. Hurley who, being released from the Army Medical Corps Reserve, accepted it. At first in error he was appointed as D.M.S., but this was rectified and he assumed the office of D.G.M.S. with the rank of Air Commodore, and was later promoted Air Vice-Marshal. Wing Commander E. A. Daley, the senior permanent medical officer of the service became his deputy and was later promoted Group Captain.

RECORDS

The question of keeping adequate medical records arose with special force at this time. During the 1914-1918 war great inconvenience was caused by the loss of many record cards of Australian soldiers, and it was important to obviate such an accident. After considerable difficulty Downes obtained approval for the establishment of a medical records section in 2nd Echelon, with similar establishments in the records sections of all the military commands in Australia and of the A.I.F. overseas. The question of the selection of a code of diseases was important also; it will be dealt with in a later chapter. It is regrettable that no inter-service coordination in this respect was attempted and achieved at this time.

This aspect of records concerned the statistics of casualties and incidence of disease, but another important aspect was that related to personnel. Technically only the Military Secretary and the Echelon and

Records Office are authorised to maintain such records, but had this rule been observed the organisation and administration of the A.A.M.C., A.A.N.S. and A.A.M.W.S. would have been greatly hindered. Personal card index systems were found essential in the D.G.M.S.'s. office, in order to have information readily available about the experience and postings of specialists of various types. Similarly duplicate files were kept of important matters, in disregard of the instruction quite unworkable in time of war, that all these should be filed in the Central Registry. Admittedly, private records and registries can be abused, and the tendency of some administrative sections to absorb records belonging to others was occasionally embarrassing, but it sometimes happened that higher central authorities were glad to avail themselves of the advantages of activities of which they officially disapproved. Later in the war registry procedures were improved and directorate files could be safely reduced in size. Even in a single directorate like that of the medical services the volume of paper which accumulated was staggering.

*EXPANSION AND ORGANISATION OF THE A.A.M.C.
ON THE OUTBREAK OF WAR*

In the early months of 1940 the armed forces expanded rapidly. The development of the special force and of the militia demanded more medical units and staff. In April 1940, following the decision to raise a corps, the headquarters of I Australian Corps was formed, and went overseas. Colonel Burston became the D.M.S. of the Corps; Colonel Disher, A.D.M.S. of the Overseas Base then became A.D.M.S. of the 6th Division, and Colonel A. P. Derham, temporarily deputed to act at overseas base, was appointed as A.D.M.S. of the 8th Division. Colonel F. Kingsley Norris was appointed as A.D.M.S. of the 7th Division.

All the essential organisation incident to the mobilisation of the A.A.M.C. was carried out in the D.G.M.S.'s. office, that is by General Downes, with the assistance of two members of the permanent staff, Lieut-Colonel A. Christie, and Mr A. J. Withers. Withers was then a civilian, but later major A.A.M.C., and did all the secretarial work on coordination for several years before the war until the Central Medical Coordination Committee and the Medical Equipment Control Committee came separately into being.

Within the Army Medical Corps itself was a nucleus for expansion. A few field ambulances and casualty clearing stations were partly equipped and had part-time militia staffs; but much remained to be done to bring the medical units up to mobilisation requirements. Invaluable work was carried out between 1936 and 1939 on estimates of the medical material needed annually in Australia. This was initiated by Downes and Cumpston, and the bulk of the work was done by Christie and Holmes of their respective departments. All wastage rates were ascertained for the whole of Australia, and when a year's supply was obtained in advance, as has been described, this was stored. The value of this store was untold; it

clearly appeared when Japan entered the war and the sources of supply contracted.

The medical services had the advantage of a compact set of instructions on action to be taken in the event of war: this was part of the general headquarters' instructions and was drawn up by Christie. The functions of the medical service on mobilisation were defined as the provision of medical examiners for all units and services, and of medical officers, the provision of facilities for dealing with sick and wounded and with their disposal, and collaboration with civil medical, ambulance and hospital authorities. Tables set out the degrees of expansion required for three stages of mobilisation, and contrasted these with the organisation existing in peace. These three stages were designed to provide for district base defence, in both precautionary and war stages, for mobilisation of a first line component, and for general mobilisation. Directions for the medical examination of recruits were appended, and arrangements for supplementing existing services by appointing civil practitioners. As no military hospitals would be available, civil and repatriation hospitals would be utilised if necessary. Services such as dental, nursing, pharmaceutical, physiotherapeutic and voluntary aid detachments were provided at appropriate stages. General directions concerning equipment were given, details being available to the D.Ds.M.S. of the districts or commands. A compact plan for all phases of a military situation was presented in this document, and the mechanisms by which the various stages were dealt with were set out clearly. In addition a plan was included for the medical organisation of an expeditionary force.

The expansion of the A.A.M.C. will be traced as this narrative proceeds; so great was its growth that at the peak of the war against Japan its strength of 32,000 of all ranks represented 8 per cent of the total strength of the A.M.F. Of this number 2,500 were doctors, 3,500 nurses and 900 non-medical officers.

THE COMMONWEALTH DEPARTMENT OF HEALTH

The advent of war meant not a little increase in the responsibilities of the Commonwealth and State health services, with in addition depletion of staffs. In some of the clinic services of the States this was especially felt, and in the extra work involved in cooperating with the medical services of the armed forces in controlling venereal disease. The wider ambit of the Commonwealth Department of Health was even more concerned with the problems of a country at war. Quarantine, always important, though little publicised, became of vital importance. Refugees and internees brought to Australia were all potential carriers of disease, and sometimes actual carriers of such conditions as malaria and amoebiasis. The possible spread of regional or seasonal diseases might at any time impair public health, and the presence of epidemics in countries outside Australia and the spread of endemic infections by reason of military movements had dangerous potentialities. The special intelligence

of an efficient health service was of great importance in time of war both to the armed Services and to the civil population.

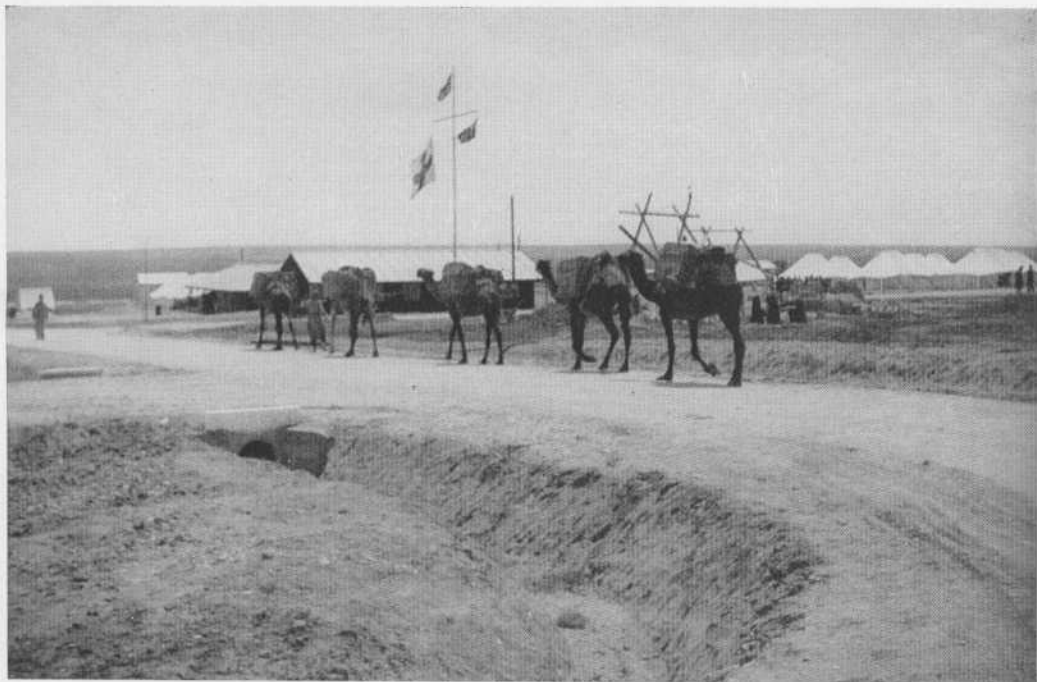
Apart from infectious disease, nutrition needed supervision also, for even minor degrees of subnutrition might have undesirable effects on a people at war. The health of the civil community was the special responsibility of the Director-General of Health, Dr J. H. L. Cumpston, who during the war represented his service on many bodies concerned with the medical aspects of war. He strongly and persistently put forward the claims of health in the community and by every means at his disposal, by official administration and personal pleading and influence upheld the cause of the civilian.

The Commonwealth Department of Health and its connected organisations gave many of its ablest workers to the services, where their special experience was of the highest value. Dr (Colonel) M. J. Holmes acted as Director of Hygiene of the Army over the important central period of the war, reorganised its hygiene system, and became the chief executive of the Advisory Committee on Health and Tropical Medicine and Hygiene to General MacArthur. The Commonwealth Serum Laboratories under Dr F. G. Morgan supplied great quantities of material for immunisation against disease and for pathological diagnosis, undertook much investigatory work, helped in the acquiring of material for original and production work, and its staff acted in an advisory capacity in technical problems. Colonel E. V. Keogh, of its staff, rendered important service as Director of the A.M.D.5 which in the latter phases of the war included hygiene, pathology and entomology. Other members of the staff served with distinction with the forces. Captain P. L. Bazeley was largely responsible for the first production of penicillin in Australia.

The Commonwealth X-ray and Radium Laboratory, through the zeal and skill of Dr C. E. Eddy and its staff made possible the early adoption of miniature fluorography of the chest. The essential technical work was carried out by Dr Eddy, who also drew up specifications for the apparatus. Much work was carried out during the war years on X-ray equipment, and routine tests carried out to ensure the safety of technicians from radiation.

The Institute of Anatomy in Canberra, whose Director, Dr F. W. Clements, worked for a number of years in the School of Public Health and Tropical Medicine in Sydney, was engaged in the study of nutrition. Many important surveys had been made in New Guinea on this subject, and the special knowledge of the staff of the Institute was of great value in the solution of problems related to the nutrition of servicemen and women, and of the civil community.

The School of Public Health and Tropical Medicine within the University of Sydney rendered constant service throughout the war. Before the 16th Brigade, A.I.F. left for the Middle East the first of a long series of courses on tropical medicine was held in the School, and Professor Harvey Sutton and his staff, in addition to routine teaching work and research relevant to war problems, carried out similar instructional work



The 2/1st Australian General Hospital, Gaza.



Entraining invalids at Gaza.



Nurses on parade in the Middle East, May 1941.

(Australian War Memorial)



Voluntary Aids for the Middle East.

(Australian War Memorial)

year by year. The teachers included medical officers of the services with special recent experience, and as time went on a very successful liaison was established between the staff of the School and the medical services which ensured that the instruction would be closely related to the problems in hand. In this way medical officers of all Allied countries whose forces were represented in Australia, and belonging to all branches of the armed Services were given technical information and training of great value to them. The relinquishing of Colonel E. Ford, and Group Captain A. Baldwin to the armed forces strengthened the technical resources of the medical services. Other members of the staff Drs W. Sawers, G. M. Heydon, R. E. Murray, G. F. Lumley and Mr Frank Taylor, entomologist, in addition to other investigatory activities helped to train many officers and others in tropical medicine and hygiene, as well as working on loan for the services on important enquiries from time to time.

The Council for Scientific and Industrial Research carried out many important, and often elaborate investigations and surveys on a wide variety of subjects, some of which were connected with medicine and hygiene. This organisation released Lieut-Colonel I. M. Mackerras for army work as a pathologist; later he became Army Director of Entomology.

The National Health and Medical Research Council also turned its attention to problems of importance in war. It continued to stimulate and subsidise research, chiefly on problems within the range of small teams, and also assisted in producing a special series of *Supplements on War Medicine and Surgery to The Medical Journal of Australia*, which were of definite educative value.

Apart from these government services University staffs and departments made great, though often unrecognised, contributions which will be mentioned on later occasions. In the scientific and medical departments their influence was specially valuable, and numbers of war problems were elucidated there. The facilities of these departments were also freely given for special training, despite immense difficulties of student teaching with depleted staffs, and accelerated professional courses. Much useful work on the synthesis of drugs was carried out in these departments.

The various institutes for medical research also gave invaluable service on clinical problems. The government laboratories in Queensland, the Walter and Eliza Hall and Baker foundations in Victoria and the Institute of Medical and Veterinary Science in South Australia made valuable contributions to current medical problems.

DENTAL SERVICES

The organisation necessary to provide a dental service engaged the attention of the D.G.M.S. and the A.D.G.M.S. (Dental), Colonel J. E. Down even before mobilisation began. Down had repeatedly tried to acquire a reserve of dental equipment but without success. Unfortunately only a limited amount of such material was made in Australia. Note was made of every recruit's dental state for purposes of record, but the

standards for recruiting were vague, the requirements being that men with adequate dentition or adequate dentures or those who could be provided with them were accepted. This really means that the state of the teeth of Australian people was so poor in 1939, as evidenced by the number of volunteers who were not dentally fit, that the principle was adopted that men would be accepted if they could be made dentally fit. The problem was colossal. Down estimated that the full requirements of a division and associated troops embraced 50,000 fillings, 40,000 extractions and 10,000 dentures. For this seven dental sections were provided.

At October 1939 dental units were provided on the war establishment of three field ambulances, one casualty clearing station, two general hospitals and one convalescent depot. Each unit consisted of a dental officer, two dental mechanics and a clerk orderly. A unit was expected to keep about 1,000 men dentally fit, but the task in hand was actually much greater, for the men were not dentally fit on enlistment. General Downes and Colonel Down made urgent appeals to have the matter reconsidered by the Finance Board. Finally after considerable financial struggles the Military Board in November approved of calling up additional dental units, one per 1,000 enlisted troops, and also sanctioned the purchase of twelve complete sets of equipment, later increased to forty.

The amount of work to be done was so great that militia dental officers were called up for stated periods to assist the full-time dental officers, and were found very useful. In the short time available it was of course quite impossible for the dental units to cope with the work outstanding, and many men of the 6th Division were dentally unfit when they embarked. The amount and scope of dental work carried out in training camps and in relatively quiet base units like hospitals and convalescent depots explain why civilians found it difficult to get prompt dental attention during the war.

Good dental centres were built in all training camps. As time went on the great expansion of the service led to the increase of divisional dental units from three to nine, and 100 units were authorised for home service. Before this expanded service could come into operation the question of employing dentists in a voluntary capacity was debated. The New South Wales Branch of the Australian Dental Association sponsored a scheme by which work was carried out by a roster of voluntary dentists at the Showground camp in Sydney. Down opposed this in principle, maintaining that full control of a military service is the best and most efficient. Undoubtedly this scheme helped the cause of dental fitness considerably in time of stringency, but it could be regarded only as a patriotic expedient.

In November 1939 Down asked for the establishment of a separate dental store, but this was not approved at this stage. However, work began on the standardising and modernising of army dental equipment. Enquiries were made also whether electric power and water would be available in the base areas to be occupied by the A.I.F. overseas, and the equipment appropriate to these conditions was sent with the first convoy.

NURSING SERVICE

No difficulty was found in providing nurses for military service. For a number of years before the war a reserve of nurses had existed, and from the time of the Munich crisis onward more nurses joined the reserve. In time of peace the nursing services reserve had little immediate significance: even in militia training camps no opportunity was taken to use female nurses in the care of the sick, who were sent to civil hospitals except for minor complaints, nor could any training in military routines be attempted. The influence of some of the more senior members of the permanent staffs of hospitals was found useful in bringing before graduating trainees the claims of the Services in event of war.

The principal matrons of the military command areas, with the assistance of experienced senior members of the profession selected nurses for the hospitals and other units. Great expansion of the nursing services took place during 1940, and by the end of the year over 4,000 applications had been received for service overseas. Two professional grades of nurses were appointed, sister and staff-nurses, but military ranks were not employed at that time. Nurses were regarded as bearing equivalent rank of officers. The general standard of health for nurses was the same as that for male recruits, but no special requirement of height or chest measurement were adopted. Sisters and staff-nurses were selected from nurses below the age of thirty-five years, and matrons below the age of forty-five. The only other question which arose concerned the possibility of gynaecological troubles in all women's services, and later an instruction was given that no special examination would be made except when the history suggested the need for further information, and then the advice of a consultant was sought. Physiotherapists, classed as masseurs and masseuses in 1939 and 1940 were enlisted as such. They were regarded as of equivalent rank to non-commissioned officers, but as regards messing, amenities and military courtesies they were classed with nurses.

VOLUNTARY AID DETACHMENTS

Voluntary Aid Detachments were recognised in 1916 by the Australian Government as auxiliaries to the medical services, and useful work was done by the members in military hospitals. After 1918 the work of voluntary aids continued as a peacetime activity in hospitals throughout Australia. Since the South African war there has been an organised association between the Order of St. John and the British Red Cross in humanitarian service. During the 1914-1918 war a Joint Committee of the Red Cross and St. John was established and both bodies have maintained jointly and independently their services in both peace and war. The Voluntary Aid Detachments have been an important branch of activity of the Australian Red Cross and the Order of St. John. These detachments consisted of men and women who were voluntarily enrolled for services which could be used to complete the establishments of the navy, army and air force or to assist with training and organisation of the detachments in time of peace. Training in appropriate subjects was carried out as laid

down in the manuals of the Red Cross, and the Ambulance Associations of St. John and St. Andrew. Close cooperation with A.A.M.C. was maintained in this training.

In 1938 the Joint Central Council of V.A.D. asked for an extension to their organisation, but it was not considered at that time desirable to depart from the existing auxiliary type of service. It was noted then that only 252 male voluntary aids out of 1,365 were classed as "mobile", that is prepared to serve anywhere in Australia; the remainder were "immobile", that is, liable for duty only within daily reach of their homes. Of 1,697 efficient female aids 374 were classed as mobile. There seemed no doubt, however, that in the event of war these figures would be very materially altered. War establishments also offered many opportunities on mobilisation to women in many capacities. The opportunity was taken to enlist a few skilled technicians as voluntary aids, but one drawback to this was that the pay was only the modest minimum of voluntary aid, which was most inadequate for highly trained persons. Further details of the work of voluntary aids in Australia and overseas are given in later chapters, and also the changes which took place in the organisation of this body.

AUSTRALIAN RED CROSS SOCIETY

With the warning of September 1938 the International Red Cross Committee advised all national societies of the Red Cross to place their organisations on a war footing. The Australian Red Cross appointed a planning committee under Dr T. E. V. Hurley, and this body collaborated with General Downes in producing a "War Book" for the Red Cross. This summarised the needs of all the society's activities, including staff, stores, transport, enquiries and services in relation to prisoners of war, auxiliary hospitals and blood transfusion.

In the early days of the war the help of the Red Cross was invaluable. Supplies for medical units were often tardy in arriving and some special equipment not on military establishments was much needed. The Red Cross could often supply these needs. It is interesting that a certain quantity of stores remained from the 1914-1918 war, but money was at a low ebb until in response to a public appeal a fund of more than £12,000,000 was ultimately established. Of course no basic equipment for hospitals was supplied: this was the responsibility of the Services, but some elasticity was possible when emergencies occurred. Special equipment was procured or made for some medical units, and reserve stores of dressings were accumulated.

The story of the Australian Red Cross will be told more fully in another place. Here it is sufficient to say that the forethought and efficiency of this humanitarian organisation made available just those services and stores which were difficult to obtain in the early stages of the war, when organisation of the forces was only gradually coming into shape, and when in consequence the need was great.

II

CENTRAL MEDICAL COORDINATION COMMITTEE 1939-1940

It is evident from what has been said in Chapter 1 that during the 1914-1918 war no coordination of the medical profession was achieved. Arrangements were made in certain towns and districts to attempt a degree of equalisation of effort, particularly for home service, and hospitals were able to give to young keen would-be volunteers for the First A.I.F. some brief preparatory instruction to the real practice of medicine. In the later years of war there was evident a growing uneasiness among medical men who were forced to make a decision that could justly be made only by an impartial authority. The *questionnaire* organised by the B.M.A. in 1917 showed that a high proportion (just under 75 per cent) of the doctors voting wished to ask the Government to introduce medical conscription for the A.I.F. This vote represented only 52 per cent of the profession, for many were already overseas, and nothing could be done. Fortunately opinion had swung in favour of a better organisation when the threat of a second great war darkened the horizon, and a coordination committee, as already told, was not only in being but in functional activity when war was declared in 1939. This is emphasised once more in order to point out the first important lesson of coordination of medical effort and service; it is that the outstanding success of this measure was due to its establishment during a time of peace. This success would have been complete had certain weaknesses been avoided earlier. Though the Central Medical Coordination Committee had held its first meeting on 13th July 1938 and was already active in September 1939, it did not function fully for some months afterwards. The first medical units of the Second A.I.F. were raised with such speed that the committee was not in a position to control the selection of their medical officers. This gave the A.I.F. medical unit staffs of extremely high attainments, but teaching hospitals in Australia lost an unduly high number of their experienced physicians and surgeons. Thus appears the next lesson, that to be fully efficient in time of war the mechanism for coordination should be a running concern, equipped with full information and endowed with sufficient power.

The *National Security Act* became law on the 9th September 1939. One effect of this act was to require "medical personnel" to practise or place their services at the disposal of the Commonwealth in places and for periods specified. The term "medical personnel" included medical practitioners, medical students, dentists, pharmacists, trained nurses and physiotherapists. The regulations under the act were proclaimed on 19th December 1939, and were amended from time to time afterwards. The original composition of the central committee was altered somewhat by changes in some representatives. Up to 1940 Major-General Downes, the D.G.M.S. of the Army acted as chairman, followed by F. A. Maguire in 1941, and S. R. Burstons in 1942. Its members were the Director-General of Health (Dr Cumpston); D.N.M.S. (Surgeon-Captain Carr); D.G.M.S., R.A.A.F. (Air Vice-Marshal Hurley); Sir Henry S. Newland and Dr

J. Newman Morris, representing the British Medical Association; Sir Alan Newton, representing the Royal Australasian Colleges of Surgeons and Physicians; the Director of Army Mobilisation (Lieut-Colonel T. E. Weavers followed by Lieut-Colonel R. J. Dowden, Colonel A. N. Kemsley and Brigadier C. E. Prior); the Director of Civil Defence and State Cooperation (Lieut-Colonel J. McCall, followed by Lieut-Colonel R. M. W. Thirkell); and the Secretary of Home Security in 1941, and as the minister's appointee in 1942 Mr A. A. Calwell, M.H.R.

The first comprehensive report of this committee estimated the total medical practitioners required for the three services on full mobilisation at 1,160 with 10 per cent annual increment for reinforcements. This later proved to be an underestimate. The need for coordination of dentists, nurses and pharmacists was not apparent then, but as will be seen, it was evident at a later date.

State Medical Coordination Committees were formed as recommended, and a sub-committee was formed to investigate the position regarding medical equipment. It was apparent even at the end of 1939 that the chief executive work would be done by the State committees. The original plan provided for the establishment of a small executive armed with the power to allot medical personnel for service or for civil work, but this was never implemented. The question was much debated in the full committee, but the majority of members were opposed to the setting up of an executive. There was in fact no unanimity on this matter, owing largely to warring interests of members whose personality and outlook could not readily be reconciled. These differences of opinion, which concerned the relative and, in the view of some members, opposed interests of the Services and the civil community, resulted in the shelving of the question.

On 10th August 1940 General Downes, as chairman of the Central Coordination Committee wrote a circular letter to all medical practitioners, in which he outlined briefly the plans drawn up within the previous two years and the applications of these to the crisis of 1939. This explained that the six State committees, thanks to the cooperation of the profession, had already been furnished with card indexes from which a survey of medical manpower could be made.

The Federal Council of the B.M.A. further supplemented this information with special *questionnaires* instituted by some of the State branches of the B.M.A., and desired that this action should be officially recognised. The work done on coordination of equipment and hospitals was also briefly described in this letter. It was, however, in the coordination of personnel that some weaknesses and difficulties were still apparent. The letter of Downes helped considerably in placing before all doctors the position up to August 1940. About 700 medical officers were then serving full-time in the navy, the army and the air force; 200 more were expected to be absorbed by the navy and the air force, 130 more at least would be required annually by the army, and up to 200 would be needed for periods of three months for the home service force. Pointing out that every effort would be made to ensure that civil medical practice would not be

dislocated, the letter appealed to all doctors to strive to make the inevitable adjustments between themselves, or through their local branches of the B.M.A. and the State coordination committees. The necessity was made plain for mutual candour and cooperation in this important decision of wartime service, a decision at once individual and national.

On 26th August 1940 the committee adopted regulations governing medical coordination and equipment, and laying down the functions of the central committee as advisory to the minister on matters affecting the provision and distribution of registered medical practitioners for the three services and the civil population, the supply and distribution of equipment and hospital accommodation. Thus the committee confirmed its chief duties as advisory, and limited its active coordination of medical personnel to doctors. Further, the regulations separated the Medical Equipment Control Committee from the Central Medical Committee, the only link being through the latter body's chairman. Here again some difference of opinion existed, for as early as September 1939 the Minister for Health suggested in a letter to the Minister for Defence that the Health Department should control importation, export and distribution of medical and surgical supplies. The Minister for Defence, however, replied that equipment could be best controlled by an autonomous executive committee; later when this action was taken the Equipment Control Committee became part of the Department of Defence. The particular object of this was to secure certainty in obtaining service supplies. At this meeting in August 1940 the committee approved of an administrative change which was to be the answer to some of the executive problems of State committees.

The burden of administration of the State coordination committees had fallen largely on the chairmen, who as D.Ds.M.S. of Commands were already weighted with responsibility and cares. The central committee noted that the normal and rational change in the source of medical reinforcements for the services was not taking place. After a year of war reinforcements should have come less and less from older age groups and more and more from the younger groups, particularly the recent graduates. Sir Alan Newton, deputy chairman of the central committee was chiefly responsible for certain administrative changes which helped greatly in removing these and other difficulties. As the committees were part of the Defence Coordination Department it seemed logical to separate them and to discontinue administering them from Army Headquarters. Further, the suggestion was made that medical officers of the defence force should be appointed as deputy chairmen of the State committees, who were able to give enough time to the task of chief administrative officers and who would take the executive work off the shoulders of the D.Ds.M.S. of Commands. Downes readily concurred with these suggestions. Some inevitable delay occurred in the implementation of this change, but by the beginning of 1941 the deputy chairmen were appointed, and appropriate alterations in the regulations were gazetted. This move was timely for the latter part of 1940 was a difficult period. The "phoney"

war was over: aggression of military power was a reality. In August the *Luftwaffe* had begun the air battle on Britain, and in September London had its first all-night raids, the R.A.F. had begun raids on Berlin, and the Italians invaded Somaliland and crossed the Egyptian border. By September the Axis pact was made between Germany, Italy and Japan, and the A.I.F. in the Middle East was training for desert warfare: yet even with the spur of these significant events the mechanism of coordination was not completely adjusted. The State committees varied in their concept of their powers, and in the energy with which they organised for the hard days ahead. Some of them asked for further executive powers, but these could not be granted, for power could only derive from the central committee, which itself had no real executive authority.

However, a practical method had now been devised whereby the central committee could fulfil its advisory functions, and the State committees their executive powers. The duties of the State deputy chairmen were clearly defined in letters written by Sir Alan Newton with the approval of the central committee. In these he pointed out that the rapidly growing needs of supplying doctors for military service must be met without penalising the civilian population or depleting hospitals and University teaching schools. This was to be done by expanding the work of State committees and simplifying its administration. The immediate tasks in hand were the careful supervision and control of the work of recent graduates and the keeping of accurate records, a survey of the ratio of medical men in practice to units of population, surveillance of the needs of teaching hospitals, and the preparing and distribution to the medical profession of such information about service requirements as would make the position clear. The excellent work already done by the D.Ds.M.S. and their committees was rightly appreciated, but the introduction of these changes enabled the increasing work to be handled without strain. A valuable suggestion was made by the central committee that the State committees coopt members to represent the interests of the B.M.A., clinical schools, and the University Medical Faculties, thus establishing a valuable linkage. Another important link with the civil medical profession was the duty of the deputy chairman to act as an "information officer" to practising doctors, and to energise them by keeping them acquainted with the true position. A special letter was also sent to each deputy chairman to ensure that a genuine coordination of all medical requirements of personnel would be the aim of his committee. It was their duty to report the results of surveys to the central committee, which could then take appropriate action with the responsible executive authorities.

At the same time as these steps were taken a full report was sent through Downes to the Minister for Defence Coordination. This made clear the necessity for making an administrative break from the Department of the Army, which had hitherto supplied accommodation and clerical assistance. This was necessary for efficiency and to ensure complete fairness of representation of the three services and the civil com-

munity. The Medical Equipment Control Committee, with its staff of five also needed separate and adequate accommodation. All these changes were approved, and their advantages became apparent in the greater efficiency, clearer understanding and closer agreement of all bodies concerned. Mr E. H. Ward was appointed as the Secretary of the Central Coordination Committee, his services being made available for as long as required by the Victorian branch of the B.M.A. The only major drawback to the new arrangements was that the State deputy chairmen had to work without possessing full authority, a difficulty only overcome by the exhibition of tact on one side and readiness to cooperate on the other. One step was taken which removed a possible source of confusion and friction. Arrangements were made to have doctors medically examined as soon as they volunteered or were called on for service so that if not found fit they would be spared the embarrassment and wastage of unnecessary personal adjustments.

In addition to other activities just described, the State committees, recognising the growing need for more specialists, took measures to institute training in special courses. In August 1940 the N.S.W. State committee suggested to the local Section of Pathology and Bacteriology that plans for courses in pathology be made. As a result the training of members of the defence services in specialties such as pathology and radiology was undertaken. The Director-General of Health made available the School of Public Health and Tropical Medicine in Sydney for training purposes.

Another problem related to military service of doctors was raised immediately after the outbreak of war and may be mentioned here. This was the economic security of members of the medical profession on service. The pay of medical officers in the services had been seriously considered by the Federal Council of the B.M.A. more than once during the days of peace, and representations were made to the Government of the day. No action resulted, however, and the matter was ventilated again early in 1940 by the B.M.A. and the Royal Australasian Colleges of Physicians and Surgeons, who pointed out that the Australian rates of pay of medical officers compared unfavourably with those in the R.A.M.C. These moves gave no relief to medical officers with financial worries. Doctors on service fell into several professional categories, including general practitioners in isolated practices, those in towns or cities in independent or group practices, and consultants. The B.M.A. through all its State branches and local associations encouraged its members to make local arrangements to safeguard the interests of absent practitioners, and these were carried out most successfully. *Locum tenentes*, though difficult to obtain solved the problem for some. Partners in a group practice made mutual arrangements for sharing receipts with an absent partner or partners. In some thickly populated suburban or rural districts with a vigorous local association the absent member's interests were served by an arrangement whereby the remaining men did work for him and returned to him an agreed proportion of the proceeds. These plans required cooperation

with the general public and the Friendly Societies; this was attained by the display of explanatory notices in doctors' waiting rooms and verbal enquiries and explanations by the doctors themselves, and by an agreement ensuring stability of the contract practices of those absentees who had agreements with the Friendly Societies. In certain urban districts which lent themselves to this arrangement the remaining doctors rendered conspicuous service both to the public and to their absent colleagues, and in addition supplied service for passive air defence and other emergency work.

The Royal Colleges undertook to look after the interests of absent physicians and surgeons. A scheme was drawn up by a sub-committee containing representatives of both bodies. This provided for a fund built up from voluntary subscriptions of their remaining members, which was applied to the assistance of the families of men engaged in full-time military service. This applied only to doctors engaged in special and consulting practice. The distribution of the fund was in the hands of a small committee, and it was administered gratis by a trustee company. After a rather protracted struggle relief from taxation on contributions to this fund was obtained. For the working of these schemes it was necessary for all information and arrangements to be completely confidential, and for all the beneficiary doctors to be completely candid concerning their income and their commitments. The smooth working of this form of economic assistance redounds greatly to the public spirit and reasonableness of all concerned. It is significant to recall that during the 1914-1918 war, coordination, though earnestly desired by many who served overseas and many others who were unable to do so, was not sufficiently prominent as one of the means of securing democratic survival to be a basis for attempts to make personal sacrifice less unequal. One result of this had been an unwillingness of some members of local medical associations to cooperate fully with schemes which required a free give and take of information.

Most useful service was rendered by the various State branches of the B.M.A., which under the guidance of the Federal Council, assisted in helping to distribute the burdens of national work at home and abroad. The Royal Colleges of Physicians and Surgeons early interested themselves in the adequate use of specialists. A suggestion was made by the D.G.M.S. of the Army soon after the outbreak of war that the Colleges might be able to assist by suggesting suitable individuals from their members for specific work, but naturally this was regarded as undesirable. The Colleges could only state that individuals had or had not been accepted as Fellows or Members. Help was given by both Colleges by their personal influence in obtaining suitable medical and surgical specialists for oversea service. A suggestion was made to Downes that senior specialists with appropriate qualifications should be placed on a roster and go abroad for a defined term of service, say twelve or eighteen months. The D.G.M.S. did not feel that he could commit himself to adopting this

suggestion. A request was made by the Colleges for representation on the coordination committees: this was granted.

It is now convenient to trace in turn the history of certain phases of coordination in relation to contemporary events.

MEDICAL OFFICERS FOR OVERSEA SERVICE

One of the important tasks of the State deputy chairmen on their appointment early in 1941 was the obtaining of volunteers from the recent medical graduates. Many of those who had volunteered for oversea service as medical officers were above the most suitable age. Early in 1940 General Downes had made clear to meetings of doctors the position with regard to the needs of the Services; at that time he pointed out that of 111 medical officers in the Second A.I.F. 71 (64 per cent) were under the age of forty and 40 (36 per cent) over forty. By contrast 86 per cent of 997 medical officers of the First A.I.F. were under forty on their appointment, and 14 per cent over forty. Even allowing for the fallacy of a small series, the average age of volunteering doctors was too high. The campaign to secure more younger men was successful in 1941 partly owing to a system of modified choice of service which was introduced. Each volunteer indicated on a "coordination form" his order of preference between the three services, on the understanding that if he could not be allotted to the service of his choice he would serve as directed by the Standing Committee of Service Medical Directors. This committee, amongst other important coordinating functions, reviewed the applications thus obtained. Without general conscription for oversea service this system provided the only satisfactory method of obtaining medical officers for the navy and air force, neither of which could accept officers for service in Australia only. To further this object the deputy chairmen of the central committee attended the meetings of the Service Directors to submit their lists of volunteers to them for allotment. Not only recent graduates were obtained by this system. Applications were classified under the headings of those under and those over thirty-three years of age, and of specialists, and these were sub-divided further into groups available immediately under stated conditions and available when relieved. Some volunteers could not be spared from civil practice, but their offer of service was officially recorded and recognised.

COMPULSORY SERVICE FOR MEDICAL PRACTITIONERS

Early in 1941 the medical profession as a body showed their practical acceptance of the principles of coordination by voluntarily subjecting themselves to the decision of the coordination committees. The doctors, recognising that an impartial central body could settle the problem of each man's sphere of greatest usefulness better than himself, and realising the need for reducing wastage of men and effort, anticipated at their own request the later ordinances which legalised medical conscription. The need for such action was made clear on the 9th June 1941 when Sir Alan Newton submitted to the Secretary of the Department of Defence a sum-

mary of the position with regard to medical manpower. This showed the following numbers:

Total Medical Practitioners in Australia	6,500
Deducted—Women doctors	500
Males over 60	1,170
Medically unfit	254
Essential Government Services	500
	<hr/> 2,424
On full-time service at 19.4.41	991
Needed to complete requirements for 1941:	
In Navy	15
A.I.F.	180
Air Force	88
	<hr/> 283
Required for full mobilisation	1,029
	<hr/> 4,727
Available residue	<hr/> 1,773

Balancing the number of women doctors and some of the doctors over sixty available for general work with specialists not available for general work it was assumed that one doctor would be available for each 3,500 of the population, the accepted ratio being 1:1,500. It was apparent that it would be difficult to supply the additional 1,029 doctors needed in the event of full mobilisation, for the practitioners then called up would be those already liable or volunteered for service, and would be inequitably distributed geographically. The deputy chairmen suggested that an amendment of the *National Security Regulation* be approved which would provide that all members of the medical profession under sixty should be liable for compulsory service. This would enable the coordination committees to select those required with regard to the needs of the civilians. These regulations were approved at a special meeting of the central committee and were proclaimed on 14th August 1941 and its powers were used to advantage straightaway. This important decision was not made without some heat of verbal combat, as the Director-General of Health, Dr Cumpston, protested that the deputy chairmen should not have acted without consulting the committee, and a very frank discussion took place, which did much towards securing full cooperation within the committee itself.

The medical profession accepted this stringent measure almost without demur. It was the first section of the community to become conscripted for full service, and to its credit, its members freely placed themselves in the hands of the Central Coordination Committee to decide who should

be called up for service. The regulations changed the purely advisory role of the committee to an executive one, for it thus was given the power to exempt from service and thus to control the doctors available for the services. Newton remarked:

As far as can be ascertained, this was the first occasion, at least in the British Empire, on which selective conscription was applied to members of one profession up to an age far in advance of that which is proclaimed as the upper age limit for conscription of all other members of the population.

A POOL OF MEDICAL OFFICERS FOR THE A.I.F.

In June 1941 the Adjutant-General received a memorandum from the Central Coordination Committee which pointed out the increasing difficulty of securing reinforcements, due in part to the entry of numbers of young graduates into private practice. The navy and air force had found it advantageous to grant commissions without at once calling up the men for service, thus creating a pool of medical officers for use as required. In order to meet requirements practically all medical graduates would be needed for service, and the proposal was made to commission medical officers for the A.I.F. on graduation, and to second them for a necessary period of work in hospitals. A slightly different scheme, based on the same principle, was adopted in the First A.I.F., when medical students who enlisted as privates were discharged to complete their medical course and then commissioned as medical officers. Though the committee's suggestion was approved it did not work satisfactorily because of the existence of two separate armies, the A.M.F. and the A.I.F. Established medical men who had volunteered for the A.I.F. but who were retained for civil work were dismayed to find that they had lost seniority to recent graduates in the A.I.F. pool. The contrast between the army and the other Services in this regard illustrated the manifold difficulties and absurdities arising out of having separate forces. After a trial the A.I.F. pool was abolished.

SHORTENING THE MEDICAL COURSE

Preliminary plans for shortening medical courses were considered by the Universities as early as November 1939. These plans were submitted to the committee in January 1941 but at that time no action was desirable. However the deterioration in medical manpower just described altered the position. The number of medical practitioners available for care of civilians had been reduced by some 25 per cent, producing conditions in civil practice which had evoked complaints from the Premiers of New South Wales and Western Australia. It was expected that 330 medical officers would be needed for the services in 1942, and the number of recent graduates in residence in hospitals was 292, the net number of fit males available for service being 263. Unless all these volunteered for service overseas there would be a considerable deficit, in spite of the successful campaign for recruits conducted by the State committees. Mobilisation needs would make the position even more acute. The central committee considered that shortening of the medical course was now

necessary, and in spite of the fear expressed by Universities that this would lower the standard or reduce the number graduating, held the opinion that the requirements of the General Medical Council could be met with a five years' course. There was a serious difficulty in the depletion of staffs of Universities and clinical schools, but the committee approved in principle of the recall of selected members of teaching staffs from overseas. Steps were taken to implement these alterations. Compulsory medical military training was recommended to consist of seventy days in the first and second years of the medical course and fourteen days in the 3rd or 4th years; exemption was granted in the final year.

OTHER MEASURES OF COORDINATION IN 1941

The army refrained from calling up all the medical officers provided in home service military establishments. Saving was also made by economy in the use of medical officers for work which could be done by laymen, for instance health inspectors, pharmacists, clinical technicians. The sub-committee of the medical directors decided in May 1941 that pharmacists enlisted as dispensers in the services should be given commissioned rank. The difficulties of civilian practice was clearly realised by the coordination committees, both from the viewpoint of the doctors and the public, but it was still apparent in 1941 that civilian authorities were unwilling to appreciate that during war the standards of medical attention must fall below peacetime level.

The committee felt it right to point out to critics that it had no power to compel a doctor to remain in civil practice against his will, though its policy was to ensure that no district was left without medical attention. Service medical officers were used where possible in meeting civilian medical requirements. One difficulty in carrying this out needed special action. Registration of medical practitioners being a State function in Australia, and the requirements varying in different States it was necessary to over-rule State powers by a regulation of the *National Security Act*. This provided that in states of emergency any service medical officer of the Commonwealth or of the Allied forces could practise as a legally qualified medical practitioner in any State or Territory of the Commonwealth. Mention of this provision here anticipates the event somewhat, but it was a logical conclusion of the position which arose in 1941.

The Employment of Alien Doctors

Before the war difficulties had arisen in the registration of medical men who had sought refuge in Australia from Nazi persecution. Some of these had previously acquired a registrable diploma in Britain, particularly in Scotland, where an additional year of study enabled some foreign graduates to register. In 1937 Medical Boards of all States conferred together and agreed that amending legislation was necessary. Apart from this the Commonwealth had rigidly controlled foreign immigration for some years, though conditions were at this time somewhat relaxed.

Medical immigrants were not admitted as such, but a number presented diplomas for approval after their arrival in Australia.

On the outbreak of war the problem became more difficult. Before the end of 1939 the question of using alien doctors for the medical care of civilians, or other work was raised to the coordination committee, which referred the matter to the minister. Possible injury of the interests of Australian practitioners was discussed at this time. In April 1941 the general stringency in medical attention brought up the matter more urgently, and it was then referred to State Governments, which were concerned with registration. Later in the year the War Cabinet discussed the use of alien doctors to relieve shortages in civil practice, and referred the matter to the Central Coordination Committee. The definition of "alien doctors" was technically somewhat different to the popular ideas; no reference was made to "refugees", and the term "alien" was used to denote nationals of countries with which the Empire was at war, or whose status was uncertain by reason of invasion, or which were at war with the Axis powers, and also included nationals of Allied countries or Empire dominions whose qualifications were not registrable in Australia. A resolution was carried subject to the approval of the Cabinet that executive action should be left to the Commonwealth Department of Health.

In certain States aliens were being registered for practice in defined areas, but it was obvious that an injustice would be done to men serving overseas if large numbers of aliens were registered in this way without a time limit. This would tend to make Australian doctors reluctant to volunteer for service, leaving practices to be acquired by aliens. The central committee therefore adopted the following principles; that the grant of licensed practice by the Commonwealth be limited in time to the duration of the war and one year thereafter, that licences to practise only be granted to aliens who satisfied an examining board as to their knowledge, skill and competence, and that aliens thus licensed should be employed only in hospitals or institutions or services not involving attendance on patients in their own homes, with the proviso that the licensing authority had the power to use aliens for medical work in localities lacking medical service. The licensing authority was the Commonwealth Alien Doctors' Board. Regulations embodying these recommendations were gazetted on 11th February 1942. The Licensing Board consisted of Dr Cumpston, chairman, Sir Robert Wade and Dr J. Newman Morris. Boards of examiners were set up in four States and aliens licensed after satisfying the examiners were used in the Emergency Medical Services and other ways to relieve the scarcity of civil medical practitioners. It was necessary to apply the test of examination to these alien doctors, as some were educated along more restricted lines of specialism than are approved by the General Medical Council and were not suited for general medical work. Licences were granted for general practitioners, of whom some were directed to institutions and some elsewhere and for specialists working in institutions or in some instances free to practise; some were granted for individual special purposes, such as a Javanese clinic. The examining boards were

concerned only with competency and knowledge and not with the numbers of aliens licensed. The National Health and Medical Research Council pointed out that in September 1941 there were less than 100 alien doctors not registrable under State laws, and that as a considerable post-war influx of foreign doctors might be expected, any action taken at this time should anticipate a future situation. It suggested that medical boards should allow alien graduates to have an opportunity of qualifying to practice by taking a special course of at least three years' duration and passing the standard examinations. Numbers of foreign medical graduates attended the latter parts of University medical courses in accordance with this scheme and so qualified for general medical work in this way.

The responsibility of the Department of Health covered the examination of the character, qualifications, knowledge and skill of the applicants; the department further after issuing licences, watched the conduct of licensed persons to ensure that conditions were fulfilled since licences could be cancelled if occasion demanded.

Alien medical officers were used in accordance with International Conventions in carrying out medical work in camps in which they were held as prisoners. This helped to economise in Australian medical officers, though all such work was done under supervision of members of the A.A.M.C. In October 1943 the Commonwealth Alien Doctors' Board recommended that the system of licensing should continue while the war lasted, but suggested that consideration should be given to recognising permanently the worth and services of such alien doctors as merited general registration. Up to 1941 these questions aroused a good deal of contention. But certain practical results followed, and all known alien doctors resident in Australia were advised of the opportunity open to them for licensing to practise. Of 132 such doctors 107 applied, and 95 presented themselves for examination in various States; 40 of them were accepted, the majority being in New South Wales. The Commonwealth Board reviewed reports on the work and conduct of these doctors towards the end of 1943 and found that almost without exception these were satisfactory. After this date the position was fairly well stabilised, and the issues were no longer so controversial. One point which emerged from this particular experience hardly needs emphasis, that is, recognition of the anomalies which arise when no inter-State coordination of registration of doctors and other "medical personnel" exists.

III

MEDICAL EQUIPMENT

As told in Chapter 1 the organisation of medical supplies for Australia in the event of war was well in hand at the end of 1939. Though the first move came from the medical services of the armed forces due regard was given from the beginning to the needs of the civil community. Three years of work assured that there was a sufficiency of common surgical instruments for mobilisation, though some items, such as scissors and

hypodermic syringes, were not then made in Australia. Field medical equipment was redesigned before the outbreak of war, and such purchases as possible were made. Most of the army equipment held in stock had been obtained from the War Office after the end of the 1914-1918 war. Under an anomalous system, though the medical services were responsible for the condition of the panniers or other packages, the Ordnance Department had custody of the equipment. Serious deterioration occurred over the years, owing in part to the lack of trained men to care for the material, and it was not until 1935 that funds were available for the replacement of obsolete equipment by modern items. Full responsibility for medical stores was only given to the army medical services in 1938.

THE MEDICAL EQUIPMENT CONTROL COMMITTEE

When the Medical Equipment Control Committee, previously a sub-committee of the Central Medical Coordination Committee, became an independent body soon after the outbreak of war it assumed control of a very wide field. It was evident that this committee, concerned with both civil and service requirements, would need close cooperation with the medical supplies departments of the armed forces. Before turning to this aspect of medical supplies the constitution and policy of the committee may be outlined. The committee consisted of a chairman, who was a medical officer of the defence forces, a deputy chairman, who was also a medical man, representatives of the Commonwealth Department of Health, and several other Government Departments, including those of Supply and Development, Trade and Customs, and a representative of the British Medical Association. Later more Government Departments were represented, and the list included Health, Supply and Shipping, Munitions, Trade and Customs (Division of Import Procurement) and War Organisation and Industry. Excepting the chairman there was no direct representative of the defence forces. Lieut-Colonel F. Kingsley Norris was appointed as the first chairman and was succeeded by Lieut-Colonel A. E. Colvin in January 1940. The work of the committee at this stage was directed chiefly towards increasing local production, and expansion of manufactures of surgical instruments and the growing of drug-producing plants such as the opium poppy and digitalis. It became apparent that the tasks concerned with medical equipment of all kinds, its production, and its controlled distribution, would continuously increase. The committee was vested with the responsibility of controlling all such supplies in Australia, and was empowered to take necessary action should shortages occur or seem probable. It reported to the C.M.C.C. concerning any matters calling for action in the regulation, restriction, distribution or sale of medical equipment, and brought important matters under the notice of the Minister for Defence. The chairman of the C.M.C.C. could delegate to the chairman of the M.E.C.C. such relevant powers of control as he possessed, and was able, under Regulations of the *National Security Act*, to implement recommendations of the M.E.C.C. Further, this act through its regulations gave the chairman of the M.E.C.C. power to

require any person concerned with a trade or business in relation to medical equipment to answer any question, or to furnish information, estimates or returns, or to produce or permit extracts to be made from any books or documents relating to his trade or business. Even the power to authorise search of premises was secured by regulations.

At its first meeting the committee stated its object to be the ensuring of twelve months' supply in Australia or in sight. Its immediate task was therefore to draw up a list of essential supplies and materials, and to ascertain the annual requirements and stocks held. On 19th July 1940 Sir Alan Newton, who had been actively associated with the committee since its inception, was appointed chairman. Mr F. C. Kent, on loan from the Victorian College of Pharmacy, was the first secretary, beginning work in October 1939, when the staff numbered only two. During 1940 Mr Jewkes, a pharmacist, was seconded to the committee, and Captain Ewen Downie was seconded from the army till his departure for the Middle East in 1941. The wide sweep of the committee's duties soon made it evident that detailed control of the myriad items which it must review would demand a very large organisation. Such wastage of manpower and money was undesirable, therefore the committee was planned along the lines of a directing body, and relinquished detailed control mainly to those organisations, governmental and commercial, which impinged on these fields. This policy was an outstanding success. By using specialised panels as technical advisers, and later, amplifying the executive arrangements somewhat, the committee, with remarkable economy, worked with a full-time staff never exceeding twelve, even at its peak period, early in 1944.

The committee maintained close liaison with the service departments dealing with medical stores. The difficulties associated with local production of items not hitherto made in Australia were considerably lightened by the ready cooperation and mutual help so afforded. An important task was early undertaken by the Army Directorate dealing with medical equipment (A.M.D. 3). The urgent need for more up-to-date equipment has already been mentioned; in addition the official scales for all such supplies stood in great need of revision. This was undertaken by Captain C. Wallace Ross, who was at the time deeply involved in supplying medical equipment for the overseas force. This directorate was charged with the functions of preparing estimates and arranging supplies of medical and surgical equipment, preparing scales of issue to units and establishments, and providing patterns and specifications, directing and inspecting supplies, distributing these to depots in the field and maintaining stocks. In drawing up a revised scale the policy followed was the supply of the minimum adequate equipment for all types of work demanded of service medical officers, and to ensure that as many items as possible were made in Australia. The soundness of this policy was proved as the war went on, and needs grew beyond expectation. Complaints were not uncommon, as might be expected, particularly about surgical instruments, but in practice, with few additions to the original list all major surgical procedures could be performed. Captain Ross also

produced a standard army catalogue including all items on the revised scale. This reduced work greatly in handling medical stores and in dealings with the Contracts Board of the Department of Supply and Shipping. Further complications were caused by the fact that each of the three Services used a different catalogue. The R.A.N. used scales of equipment laid down by the Admiralty, to facilitate replenishing stores of ships from British bases. The R.A.A.F. used its own catalogue. This increased the work of the Contracts Board, and later with the growing pressure of mobilisation, made administration needlessly complex and even gave rise to undesirable competition for scarce items between the services. This anomaly necessitated further coordination at a later date. The committee felt that agreement between the three Services in this matter was demanded in the interests of efficiency, and began to exert pressure towards this end. The drawing up of this standard catalogue for the army did a great deal to systematise supplies to the services, and stimulated local production for both service and civil requirements. Limitations of the items to the minimum also enabled reserves to be more readily maintained.

Drugs. In the building up of reserves of essential materials the committee first determined what were the essentials. In the matter of drugs this was a most necessary step, especially as many drugs were only obtainable then by import.

Dr B. L. Stanton, with the help of collaborators, compiled a list of 130 essential drugs. Of these thirty-three were made in Australia from raw materials locally obtainable. An arbitrary decision was made to increase stocks to the level of three years' normal civil supply. In the preparation of this minimum pharmacopoeia the principle was followed of including one drug for each disease. This cutting down of the more than 4,000 preparations of the *British Pharmaceutical Codex* to the bare essentials meant the rejection of drugs of several kinds, those of little value, of which there were many, others of relative value, and even of certain refined products. For example, the glucosides of digitalis were excluded in favour of the powdered leaf alone. Drug firms were still able to import additional preparations of drugs, subject to import quotas and currency restrictions, and it was not desired to restrict the drugs used in Australia to such a spartan list, though it contained all that was needed to meet minimum therapeutic requirements. The supplies of drugs held by the Commonwealth Department of Health at Portsea till early in 1940 were then transferred to the M.E.C.C. These stocks formed the greater part of the timely pre-war purchase previously described, which, originally acquired for less than £70,000, were probably worth half a million of money to Australia. The stated value of the drugs transferred was then £54,363. They were housed and cared for by the Army Base Depot Stores in Melbourne, a satisfactory and economical arrangement. At the same time a trust fund was opened by the committee to provide money for future purchases with the approval of the minister. These reserves were augmented by the addition of large quantities of surgical dressings, suture and hypodermic needles, syringes and thermometers.

In order to implement the decision to increase stocks the large wholesale drug firms were asked to import with Government help. At a meeting of representatives of the trade with Sir Alan Newton held on 26th June 1940 the position was discussed, and a general meeting of the whole trade was held in July at which cooperation was promised. The original representatives met the chairman again on 31st August, and pointed out that considerable expenditure of funds would be involved. A representative of the Department of Supply and Shipping outlined a Security Stocks Agreement, but the terms were found unsuitable for the purpose, since they were devised for stocks of a very different kind, without such wide variety of items. In September 1940 the firms concerned decided to place orders for essential drugs, which would bring the reserves up to the level of two years' requirements. They asked that the Government would undertake to prohibit imports after the war till excess stocks were exhausted and to maintain prices, but without waiting for formal undertakings they placed orders at once on their own responsibility. Later advice from London showed that shortages would cause serious delays, and orders were in part duplicated in America, with the result that all the drugs arrived in due course in Australia. In placing these orders all competition was eliminated so as to avoid a rise in prices, and with the support of the Departments of Defence and Supply and the Treasury these supplies were declared to be security stocks. The sum involved was about £300,000, and the greatest credit is due, not only to the efforts of the committee, and in particular the personal influence of its chairman, but also to the patriotic response to a national need which led the business firms to take so decided a financial risk, and expend so much money in securing two years' supply of essential drugs. The wisdom of this move was confirmed over and over again in the next two years.

Despite all efforts some shortages of drugs were inevitable, and as world production decreased owing to war conditions stringency was to be expected. When certain preparations became scarce a run on alternatives would take place, and stocks of these in turn dwindled. Special measures were necessary to ensure economy. Economy circulars were sent out to all medical practitioners and hospitals. The first of these was circulated on 1st August 1940; it covered a number of items which were particularly scarce. A special letter was sent at the same time to the D.Ds.M.S. of Commands setting out the position, and pointing out that the cooperation of large wholesale firms had made the committee's task less arduous, and that the committee had not itself entered the buying field, or exercised its statutory powers in any form of restraint of buyers. Nevertheless such strict economy was necessary that any attempt of users of medical equipment to buy or hoard was strongly deprecated. Sir Alan Newton also addressed meetings of doctors in New South Wales and Victoria; his address which was published in *The Medical Journal of Australia* of 9th November 1940, frankly placed the position before the medical profession.

Drug producing plants. The question of growing drug producing plants in Australia was being carefully investigated. A representative of the

Council for Scientific and Industrial Research¹ conferred in 1939 with representatives of The Royal Australasian College of Physicians and of the drug trade, particularly with reference to the production of opium, digitalis, hyoscyne and belladonna. Much investigation was carried out subsequently by officers of the C.S.I.R., particularly of the Division of Plant Industry, and analyses were carried out by members of the staffs of the Department of Pharmacology in the University of Sydney and the Department of Physiology. Opium was the most important drug investigated. Supplies had come chiefly from the Balkans, but when these failed India again took up production. At one time in the interim Australia had only three months' supply left. To meet Australian needs a yearly growth of 450 acres of *Papaver somniferum* was necessary. Seed was obtained and grown in 1940, and methods of extraction of opium were investigated, chiefly from the poppy juice rather than from the capsules. In 1940 also the possibilities of growing cinchona in Australia and New Guinea were examined by the C.S.I.R. and seed was planted in New Guinea.

Pyrethrum had been cultivated in Australia on a small commercial scale before the war, but did not interest growers, and further trials were made in 1939. Ergot of rye was another problem. Supplies became very scarce in 1939, even more so in 1940 when Italy entered the war. Cultures of fungus were issued to rye growers by the New South Wales Department of Agriculture, and the yields examined by C.S.I.R. and the University department. In 1940, 200 acres of rye was inoculated in N.S.W., and yields of alkaloid were good, and above the minimum B.P. standard, but difficulties were expected from adverse weather and in harvesting the product. Similar troubles were experienced with opium poppies; the cost of incising and draining latex from the capsules was prohibitive.

So matters stood at the end of 1940. It was evident already that there were many scientific problems to be solved, and also that there would be difficulties in commercial growing by reason of the relatively small quantities involved and the high cost of production.

These difficulties had hitherto stood in the way of manufacturers who had tried to utilise raw products of various kinds in the country, suitable for making medicinal substances. The same difficulties attended the isolation of certain drugs in a chemically pure form, such as alkaloids and glucosides. This problem had been taken up by the Council for Scientific and Industrial Research, with the help of voluntary scientific workers in various States. It was known that belladonna, hyoscyne, digitalis, opium, colchicine and senna amongst others could be produced, and Mr H. Finnemore reported from the University of Sydney that work was well under way for the preparation of atropine and hyoscyne from a species of *Duboisia*, which grows freely in some parts of Australia and contains 2.5 per cent of hyoscyne. Further illustrations of the scientific possibilities of the committee's work and influence were not necessary to point the lesson of economy at that time; later references will be made to these.

¹ More recently known as the Commonwealth Scientific and Industrial Research Organisation.

Practical suggestions were made to the medical profession as to the best methods of using economically such drugs as were available. Dr Stanton and others drew up formulae for antacids, antiseptics, diuretics, expectorants, iron preparations, inhalations, liniments, laxatives, the so-called "tonics", ointments, creams and soaps. These were published and circulated with an explanatory statement. Certain drugs caused anxiety. Calomel increased in demand by reason of its use in venereal prophylactic sets supplied to the forces. The committee held a reserve, but continued to replace the used portion of this after relieving a rather acute situation. A shortage of sulphapyridine was also threatened. It had been used almost to the exclusion of other sulphonamides, probably, as Sir Alan Newton suggested, because of the free publicising of its easily memorised trade number, M & B 693. To offset this and to ensure that adequate supplies should be available in case of being urgently required in the treatment of cerebro-spinal meningitis, regulations were gazetted prohibiting its sale except on medical prescription, and medical practitioners were requested to confine their use of the drug to cases in which the indications strongly favoured sulphapyridine rather than other preparations. At the end of 1940 great economy with use of this drug was still necessary, but arrangements were being made to manufacture it in Australia or to obtain it from firms producing it under licence in America. The reserve held by the committee was only 250,000 tablets, not a large quantity for the community.

Local manufacture of a number of drugs was carefully considered. For some drugs local manufacture was thought impracticable, not that the task was too difficult nor that the committee was not willing to foster research, but the best methods of using time and money had to be considered. For instance arsenical preparations were investigated from this angle, but it was thought that owing to the fact that raw materials unobtainable from industries in Australia still had to be imported, and that as the cost of necessary plant would be high, it would be better to import them. Research on some antiseptics of the flavine group was, however, considered to be very promising, as was borne out later by results of scientific importance on a commercial scale.

Surgical supplies had also been the subject of earnest enquiry. Surgical gauze at this time was not manufactured locally, and there seemed little likelihood of this being done. As this gauze was used for other purposes than purely surgical it was difficult to arrive at an estimate of its annual consumption, but this was put down to about five million yards, an amount which economy could probably reduce by 20 per cent. An attempt was made to secure a three years' reserve through the trade, but it was more difficult to obtain concerted action of the same degree as in the case of drugs. Therefore the committee placed an order for three million yards, planning to hold one million yards as a military reserve. In addition, two years' supply would be covered by orders made by two firms, and further assistance from other firms was expected. At the end of 1940 only one million yards reserve was held in Australia. Great economy was therefore necessary and all surgeons were asked to cooperate in a drive against

unnecessary extravagance. Further it was now imperative to unite in using the more loosely woven gauze conforming to the standards of the *British Pharmaceutical Codex*, and to forego the more closely woven but expensive types hitherto preferred by many surgeons. Reclamation of gauze was practised in many hospitals, and, though it was admitted that it was easier to reclaim closely woven gauze, an improved method was described in the economy circular. The cooperation of surgeons was asked in these measures, which could effect a considerable economy in cotton. Cotton wool was manufactured in Australia, but only a limited amount could be made from local crops. Most of the raw material came from India, but the reserves of Indian cotton were not sufficiently large to permit of any extravagance. The committee was also investigating the use of substitutes such as were used in the 1914-1918 war. Bandages were in reasonable supply: flannel of local manufacture could be used for many purposes, and reclamation of gauze bandages was possible. Adhesive plaster was not being made in Australia at the time, but plant was then being installed by one firm. One difficulty with this product was that reserve supplies could not be kept in good condition for more than six months.

Surgical instruments constituted a difficult problem because their manufacture had not been found commercially encouraging before the war, owing to demand for imported instruments. Standardisation had simplified this problem to some extent. Sir Alan Newton informed Australian surgeons that Australia would have to be largely self-supporting in this respect and that they would be forced to use instruments of standard patterns, remembering that good work can be done with simple tools. Certain instruments were not made in Australia: these included optical and illuminated instruments, gum-elastic appliances, suture needles, hypodermic needles, detachable scalpel blades, syringes and thermometers. Casualties in all-glass syringes and thermometers had been so alarming, a reflex of the old days of plenty, that the utmost precautions were enjoined on all users of these articles so as to obviate breakage. "Record" type syringes were unobtainable, and the total stock of all-glass syringes amounted to one week's normal civil consumption.

Manufacturers had been pardonably hesitant to take up manufacture of many instruments, and there were numerous technical difficulties. These the committee was striving to overcome. At the end of 1940 the most practical measures for expediting increased local supplies were the maintenance of close personal contact with manufacturing firms, and giving them facilities for obtaining material and plant and technical assistance. The largest possible orders were also placed for manufactured items so as to favour planned production, and prompt payment was ensured as far as possible. Great difficulty was found in placing orders in Britain, and the committee, with the approval and help of the Department of Trade and Customs, took steps to facilitate importation from America. For example, orders placed in Britain eighteen months earlier for syringes

had only been one-third filled. The need for reducing American credits was another argument for economy.

Dental supplies were restricted, but the largest firm in this field laid down large reserves at its own expense. Some items still had to be imported, and the same position held with X-ray and pathological equipment. Rubber was very scarce and supplies were dwindling, therefore the committee restricted the amount available for local manufacture of medical equipment using rubber.

Catgut was a material which gave rise to some trouble. The requirements for Australia were reckoned at two and a quarter million feet per year, but three firms were producing in all three times this quantity and could increase this output. Technical problems arose and a careful enquiry was instituted into the physical qualities and sterility of the gut supplied to the army. This investigation showed that greater precision was required at times to ensure sterility of some makes, the most reliable method being heat. Manufacture proceeded under careful bacteriological control. Packing catgut caused difficulty too, through shortage of glass tubes, as all the glass tubing was imported. Lengths of fifty feet and over gave no trouble as these were packed in jars. At the outset of war General Downes had realised that silkworm gut which was solely supplied from Spain would be very scarce. He bought a quantity on his way through America, and met with temporary difficulty in its importation, as it was at first thought to be silkworms and not sutures which were intended. No silkworm gut was made in Australia.

Enquiry was begun into these medical materials which might be exported from Australia. Biological products came into this category: these were made in quantity at the Commonwealth Serum Laboratories, and all were available for export. Many such products are perishable, and could not be prepared in bulk in expectation of orders. Large orders required ample notice.

At the end of 1940 the medical supply position was acute in some items and restricted in others, but local production was increasing, alternatives were coming into use, and doctors and pharmacists, wisely taken in as voluntary partners in an economy campaign, were adjusting their outlook and practice to the conditions of war. The cooperation of the British Medical Association was most helpful here, especially in using its periodic circulars to its members for the promulgation of information and warnings concerning the use of scarce materials.

CHAPTER 4

HEALTH AND HOSPITALS

AT the outbreak of war there were no army hospitals in Australia. The navy had sufficient accommodation for its own requirements, and air force stations had enough for their needs. The only beds available for army use were those not in use for repatriation cases in the repatriation hospitals. The general principle was laid down that beds should be available in base hospitals for 2 per cent of the total number of troops in Australia, and in camp hospitals for another 2 per cent. The total requirements of 4 per cent were found to be sufficient except when unusual demands were made, for example when relapsing malaria unduly swelled the numbers of admissions, but in this figure no additional provision was made for casualties returning from the Middle East.

CAMP HOSPITALS

The first necessity was to equip camp hospitals in the principal camp areas throughout Australia, but until this could be done arrangements were made to secure temporary accommodation in the various States in civil hospitals. Extemporised camp hospitals were equipped in pavilions in the Agricultural Showgrounds in various capital cities, and, though all the buildings were not entirely adapted to this purpose slightly ill men could be given adequate attention.

Though accommodation for troops in each camp area was maintained at 2 per cent there was a wide variation in hospitals in different commands both with regard to the compactness or otherwise of the areas served and the type of accommodation provided. After some time standard plans were prepared for various camp hospitals in different parts of Australia, though at first it was difficult to attain conformity to this standard, as each command or lines of communication area, as they were later, had its own ideas of design.

There was in fact not as much coordination in such matters as might have been, for it sometimes happened that approval for erection of a camp hospital was sought only after the expenditure of a deal of time and energy on its plan. However a number of good standard hospitals were constructed and equipped in various States, such as Bathurst, Cowra, Ingleburn and Greta in New South Wales, Bonegilla and Puckapunyal in Victoria, Woodside in South Australia, and Northam in Western Australia. In a few of the larger camp hospitals some emergency surgical work could be carried out, but most of the buildings were adapted only for handling the lesser medical illnesses. Even in the best camp hospitals there were features which could be criticised, but economy was always a condition imposed by finance authorities, even though it did not always prove to be far-sighted. The standard camp hospital design provided wide verandahs which in emergency could accommodate a reserve

of beds equal to those in the wards, thus allowing the bed establishment to be doubled in a crisis by obtaining extra ordnance supplies. This was kept strictly as a reserve, and not brought to official notice, since temporary accommodation in hospitals as elsewhere is prone to become permanent. However, the value of this emergency expansion became evident later when full mobilisation took place. Standard plans were prepared in August 1940 by the Department of the Interior for three sizes of camp hospital, providing respectively 30 beds, 60 beds and 120 beds.

Many adequate camp hospitals carried out good work in buildings less commodious and convenient than the standard type, and there were in addition others which had been extemporised from existing structures and were practicable though sub-standard. Tented camp hospitals or extensions of hospitals were also used, but as the usual function of a camp hospital was that of serving an area selected as a training camp, it was desirable that more permanent buildings should be provided. It was of course possible to do good specialised work without more than the bare minimum; for example in Queensland the camp hospital at Enoggera did much of the dermatological work of the area, and at the 7th Camp Hospital at Redbank Major G. B. V. Murphy successfully carried out insulin coma treatment of men with psychiatric disorders.

Though there will always be a need for hospitals in camps, quite apart from a high standard of health and hygiene, this need is influenced by the presence of epidemic disease. Therefore it is necessary to consider the health of the troops in camps after recruitment and during preliminary training, and its relation to their nutrition, environment and exposure to current infections.

CAMP CONDITIONS

A good deal of criticism was directed against military camps during the early part of the war. Some of this was to be expected, as obvious difficulties arose in providing in a short period of time good accommodation and living conditions for an ever-increasing body of men in every Australian State. Some camp accommodation was poor; for a time some was very poor. Australians are used to sunshine, and many of them live along the seaboard, and know so little of other parts of their country that they tend to forget the summer maximum temperature is high in most places suitable for camps, and that the winter minimum is frequently low. Even pleasant open country when used as a camp site becomes a bare area in summer, glaring and hot, and veiled in clouds of dust. In winter it is usually muddy and cold, judged by Australian standards. Under such conditions huts may even be inferior to tents, especially when unlined and with permeable floors.

The most serious defect of accommodation was overcrowding which became evident in some military camps in the winter of 1940. In July of this year the camp medical officers complained that the men were overcrowded in living and sleeping quarters, and criticised the camp hygiene, the lack of drainage and sewerage, the scarcity of hot showers, and also shortage of medical supplies.

The Military Board was well aware that overcrowding was occurring in certain camps, and issued a reminder to each command that these conditions had been largely responsible for a serious outbreak of cerebro-spinal meningitis during the 1914-1918 war and should be avoided as far as possible. A specific instruction was given that at least 5 feet must be allowed between centres of beds, so as to give each man a total floor area of 45 square feet, and not more than six men were to occupy tents measuring 12' x 14'. These measurements were taken as a general standard though it was sometimes impossible to conform with them. In a few places men slept on palliasses that were practically touching, and the expedient of having men sleep with the head and foot of the bed alternating was tried when respiratory epidemics broke out, but it was never found satisfactory, and from the point of view of comfort the men disliked it. General Downes pointed out that even the standard space allotted to each man was barely sufficient, and below the usually accepted figures of 6 feet between the centre of each bed and a total floor area of 60 square feet per man.

ILLNESS IN CAMPS

This difficulty in accommodation, like the defects of hygiene and lack of amenities, was due to shortage of time, men and material. Of all these, overcrowding and lack of strict precautions in handling, preparing and distributing food were the most important in their bearing on epidemic disease, which, especially in the form of respiratory infections and diarrhoeal disturbances is prone to attack military camps. During 1940 there were the familiar epidemics of zymotic disease found among young people, living under service conditions more closely than is usual in civil life, subjected to exposure to climatic changes, fatigued by unaccustomed tasks and exertion, and, at first, sleeping less soundly till they were inured to their new surroundings. There was in the large camps a considerable outbreak of upper respiratory tract infection which spread widely through the civilian population also. At one time the Melbourne City Health Officer estimated the general incidence as over 10 per cent, while certain business firms had up to 20 or 25 per cent of their employees off duty. A true influenza virus was isolated in some of these outbreaks, but the popularity of the military term URTI, upper respiratory tract infection, led to a general adoption of the abbreviation "Urti", or alternatively local labels such as "Ingleburn", "Puckapunyal" and "Woodside" throat. The strain on camp hospitals was considerable at this time: in Puckapunyal during June 1940 there were 250 men in hospital each day. Other infectious diseases appeared also, such as mumps, measles, rubella and scarlet fever. Fortunately complications of mumps were not common; orchitis and epididymitis were not frequent among men with mumps, and involvement of the nervous system was rare. Pneumonia occasionally occurred in men with measles, particularly when respiratory tract infections were common. The long incubation period of mumps made it impracticable to isolate contacts or to prevent spread. The question was raised whether it was wise to allow men to embark on troopships for

service overseas who had been in close contact with men with mumps in heavily infected camps, but it was decided not to hold up embarkation. Rubella was widespread, but gave no special trouble, though occasional cases were of moderate severity.¹

Scarlet fever was for a time rife in the civil community, but in the armed forces never caused alarm, nor was it necessary to carry out Dick tests with a view of immunising unprotected persons, as was found advisable in Canada.

The problem of nursing in the camp hospitals was one of considerable magnitude. Accommodation for nurses was only provided tardily in some camps, and medical and nursing equipment and supplies were scarce, but the value of trained nurses in camps was great. The difficulties of training orderlies are considerable at any time, but under conditions of rapid expansion of Services in time of war these are multiplied. Nurses can help in this training even in camp hospitals, but their chief value here is in the raising and maintaining of a high standard of nursing of men with ordinary epidemic illness, which often demands considerable care. The conditions available were far from satisfactory in some camps; on occasion there was no alternative but to treat men temporarily in converted, and sometimes unlined huts without proper heating, and in a few instances without bedsteads.

Where rapid spread of epidemics like the respiratory infections imposed a greater strain on existing services than could be met local organisations sometimes provided an emergency service. The Red Cross Society also rendered valuable assistance in camps by providing equipment and comforts. Lieut-Colonel H. H. Turnbull was appointed as an inspector of hospitals; he visited all areas and reported on accommodation and standards of care.

As early as June 1940 the original estimate of a sick rate 5 to 6 per cent seemed too high as a basis for providing hospital beds, but in Puckapunyal, as an example, the rate was 4 per cent contrasted with 2 per cent over the whole number of 71,000 troops in the army in Australia. Even this rate imposed a strain greater than the local facilities could stand. The Royal Australian Air Force with its newly independent service faced with growing commitments, also had a hospital rate of 4 per cent. The shore establishments of the Royal Australian Navy likewise had full demands on their capacity during this winter.

Cerebro-spinal meningitis had appeared in the army at Redbank in Queensland as early as December 1939. Major H. M. Trethowan, the Australian Medical Liaison Officer in London had kept the D.G.M.S. constantly informed concerning the measures adopted in England, to counter the risks of an outbreak. Fortunately no serious epidemic occurred

¹ Its occurrence in the civilian community gave rise to an important observation. In 1941 Dr N. M. Gregg of Sydney drew attention to the relationship between cataract in babies and the occurrence of rubella in the mother during the early months of pregnancy. During the years following this outbreak numbers of instances of congenital affections were found in children of an age consistent with the possibility of these anomalies being associated with a pre-natal infection by the virus of rubella. Subsequent investigations have supported Gregg's observation, and the relationship of this infection to defects of hearing and abnormalities of the heart as well as cataract is established.

in Australia such as was experienced in the 1914-1918 war; owing largely to the careful hygienic methods adopted and the possession of specific drugs in the sulphonamides. Where cases of infection occurred contacts were observed, but not isolated except at the discretion of the medical officer. Soldiers were still allowed the usual leave from camps, and visitors were permitted. Any signs of catarrhal disturbances in soldiers were noted and observed and appropriate treatment was given. Where meningococcal infection was suspected prompt action was taken, and special instructions were circulated to all areas and medical officers. The early institution of treatment was recognised as imperative. This was not easy to control in a disease that only appeared in little more than an occasional and sporadic form. The aims were to remove the patient at once to a hospital where he could be efficiently treated, and to lose no time in administering a sulphonamide drug in the meantime.

A forward step was taken in the late winter of 1940 when plans for camp hospitals were standardised, and the camp conditions improved accordingly. This question of applying the prophylaxis and treatment of disease in hastily prepared training areas is of course one of men, materials and finance. Before leaving the subject of epidemic disease of types common in military camps, something more may be said of the reaction caused on the public. On this occasion criticism of service arrangements was particularly free, and had some basis of fact, for the meagre facilities existing in camps at the outbreak of war could not be expanded quickly enough to provide all desirable requirements. It is natural that during a national effort complaints and criticisms flow in a steady stream from many sources. Though this has its uses, and even provides a lever for moving unreasonable obstruction to action, an incredible wastage of time and effort often results. In addition to complaints, countless suggestions are made for the treatment of disease, and specific remedies are vaunted of undisclosed composition and fantastic potency. All such suggestions demand some reply from the busy medical administrator; yet he must be tolerant; he knows that scientific research and witch-doctoring co-exist in the most enlightened communities, but he understands that the anxiety begotten of tension demands some consideration.

NUTRITION IN CAMPS

The nutrition of troops under training was carefully examined. Many of the problems were those of transport and supply, and of catering. The Nutrition Committee of the Commonwealth National Health and Medical Research Council in a report on diets in Australia drew attention to certain deficiencies in vitamins, and to the need for the use of whole-meal, of adequate supplies of vegetables and fruit and of correct methods of cooking. In December 1940 the Director-General of Health advised the Director-General of Medical Services that the nutrition committee recommended that an investigation be made into the vitamin C saturation of soldiers in each command on the standard army diet. The D.G.M.S. instructed the D.D.M.S. of each command to carry out tests after con-

sultation with the member of the committee in his State. Colonel Sir Stanton Hicks advised a simple technique in which the urine was tested for ascorbic acid before, and four hours after the administration of 300 mgm. of ascorbic acid. The second specimen should contain double the concentration of ascorbic acid. Investigation along these lines did not reveal any serious lack of vitamin C. It had been suggested that there might be some relation between lack of this vitamin and the rather common incidence of gingivitis, but enquiries at this time and later failed to establish any definite connection. In the Eastern Command Major J. Glyn White, D.A.D.M.S. of the 8th Australian Division, reported that tests had shown gross deficiency of ascorbic acid in a small group of private soldiers, but less in officers. The diet as it reached the troops contained too much carbohydrate, and not enough milk, green vegetables and fruit, though it was pointed out that most men while in camp in Australia, at least, supplemented their diet by food obtained elsewhere.

No other serious deficiencies were obvious, though the strictures of the Nutrition Committee of the National Health and Medical Research Council on Australian diets in general were no doubt applicable in some degree to the dietary pattern of the Australian men and women who received service rations. The council considered the diet supplied by the navy was better than the army diet, and thought that the quantities of meat, bacon and cheese might be reduced, and peas, beans and dried fruit added. Even with the addition of three eggs a week, powdered whole milk for drinking and powdered skim milk for cooking, it was doubtful if the service dietary provided enough vitamin B. This raised the question of reinforcing white flour with wheat germ, which was debated greatly during following years.

In general the health of the recruited men was satisfactory. It seems impossible to alter patterns of living, eating, sleeping and working in a large number of people without exposing weaknesses in their immunity to epidemic disease, but when these trials are surmounted the men enjoy better health, that is, are hardened and better able to withstand the rigours of a military life.

BASE HOSPITALS

Nevertheless there is always some declared sickness among troops; accidents alone require hospital beds and all the concomitant equipment, and the ordinary non-infective diseases of civil life attack the same age groups in armed Services. Since reinforcements are always under training there is a continuous call upon camp hospitals, in which all the patients are kept only for short periods. An overflow into base hospitals must therefore always occur, and when action occurs overseas or elsewhere there will be further need for treatment of more serious medical and surgical casualties. An increasing number of men will need this service, and, as many of those admitted to base hospitals are likely to be unfit for further active service, a long view must be taken of the number of hospital beds required. Lastly, the needs of the civil community must be

considered: in most countries the demand for hospital beds far exceeds the supply even in times of peace, and therefore civil hospitals cannot be expected to meet military demands unless great expansions are made.

The need for base hospital accommodation in the capital cities providing for the highest grade of medical attention for servicemen and women was recognised on the outbreak of war. It was soon apparent that there were differences of opinion as to the best method of supplying this need. There were several alternatives. Separate army hospitals could be established, or existing repatriation hospital buildings and staff could be used with some additions, or the repatriation hospitals could be used with new buildings and with the addition of army staff. Most of the immediate requirements were those of the army, for there were no military hospitals. The Royal Australian Navy already used the repatriation hospital in Sydney and had an adequate hospital at Flinders in Victoria, and in any case the ships were not likely to spend much time in Australian waters at that time. The air force had limited facilities at a few stations. It was evident, however, that permanent or "semi-permanent" hospitals for the forces would have to care for all the Services.

Repatriation hospitals in the capital cities, with some help from civil hospitals, particularly in the smaller centres, could cope with the situation for a time, but within a month it was clear that the needs of the militia, the garrison battalion troops, the new expeditionary force and the growing air force could not be met in this way. In October 1939 General Downes prepared an estimate based on a total strength of 75,000, excluding the navy, which might also require hospitals in addition to those available. He expected a daily evacuation rate of 3 per 1,000 per day, and pointed out that a constant 5 per cent rate of sick might be expected among the older garrison troops. Camp dressing stations could accommodate 730, but by the end of November 1939 an additional 1,145 beds would be needed in general hospitals in Australia. This figure was expected to rise to 3,110 beds by the end of April 1940. These figures referred only to sickness arising within Australia, and were merely provisional. The real problem concerned the future hospital needs of the armed forces, and around this a battle was fought which seriously delayed the provision of base hospital accommodation.

From the early days of the war General Downes and his assistant Major E. L. Cooper, were insistent that the best plan was to establish separate military hospitals in each capital city, independent of repatriation institutions and civil hospitals. The use of repatriation hospitals had the advantages that the services of existing technical staffs would be available, and that the cost would be lower than that of providing new facilities. But against this, military control would be lost, different record systems were employed, the degrees of expansion possible in existing institutions differed, and it was doubtful if it was wise to treat young soldiers of an expeditionary force in the same hospital as the aging soldiers of a previous generation. For at least the first year of the war the Repatriation Department handled nearly all the military patients in capital cities. During this

period, while the military commitments were steadily growing, and the medical requirements increasing, discussion went on as to the best course of action.

Downes on his return to Australia in September 1939 advocated the provision of beds at the rate of $2\frac{1}{2}$ per cent of troops in training during the summer months and 5 per cent in winter, 1 per cent of the sick to be accommodated in camp hospitals and the remainder in military hospitals. As has been already seen, this estimate was reduced later, Downes was opposed to the use of civil hospitals as a principle, as the need of civilians must be considered. To meet present requirements one A.I.F. general hospital could be used in N.S.W. and one in Victoria. The hospitals chosen were then being raised and were not likely to go overseas for some time, and could thus provide the necessary services in hutted accommodation which could be quickly built. This suggestion was obviously only of temporary nature, and was expanded to provide new hospitals in New South Wales and Victoria, with additions to repatriation hospitals to give 400 more beds for immediate use in Sydney, 100 in Melbourne, 30 in Brisbane and 150 in Perth. Before the end of October 1939, representatives of the army and the repatriation commission conferred, and reported that as a matter of urgency extra beds should be provided within a month, amounting to 90 beds in Queensland, 520 in N.S.W., 400 in Victoria, 50 in South Australia, 55 in Western Australia, and 30 in Tasmania. Some of these beds could be obtained by using existing buildings, but others required new wards. By 1st May 1940 the corresponding figures for the States were expected to be 260, 1,380, 1,080, 150, 150 and 90.

On 4th November 1939 came the first indication of the controversy which was to occupy much valuable time and energy. Disagreement was not over requirements, but over the method of administration of the hospitals for the forces. The Minister for Repatriation (Mr E. J. Harrison) submitted to the Minister for Defence that repatriation hospitals should be used in preference to military hospitals. The Minister for Defence (Mr G. A. Street) approved a minute from the Military Board, which recommended that the original plan be followed but amended to provide for the immediate building of 240 bed wards in Sydney and Melbourne with provision for expansion to 1,200 or 1,000 beds. This suggestion, like many compromises was open to serious criticism, as the essential services adequate for 240 beds cannot be expanded to cope with 1,000 beds except with extensive structural alterations and additions, unless facilities to service 1,000 beds are provided from the beginning. The Advisory Panel on Defence Works, after conferring with the D.G.M.S. and the Chairman and Principal Medical Officer of the Repatriation Commission, agreed with the amended plan, but as no move had been made since the War Cabinet had approved of building more hospital accommodation, General Downes on 11th December 1939 sent a statement to the Adjutant-General pointing out that the medical directorate could not be held responsible for the delay that had occurred, nor for public criticism that would arise if the army was found to be unprepared for care of the sick.

Sir Walter Massy Greene, financial adviser to the Treasury now entered the lists with a criticism of the number of troops expected by the Military Board, the estimated rates of sickness and the expectation of increased rates of sickness in camps. He therefore advocated the building of permanent wards on to repatriation hospitals and the use of the Melbourne Hospital for returning casualties, as he considered that sufficient accommodation was already available for troops in Australia. The figures had actually been based on standard authorities, and in view of the imponderable factors involved proved later to be reasonably accurate. In anticipation of experience during the later part of 1940 it may be stated here that 4 per cent proved to be a safe total provision, half of the sick being held in camp hospitals and half in base hospitals.

Meanwhile plans and estimates for the buildings had been begun during November 1939, but even by the end of January 1940 no firm decision had been made. The Board of Business Administration conferred with the army and repatriation medical directors, the chairman of the Repatriation Commission and other medical experts, who endorsed the proposals already made. The Military Board also concurred, and the War Cabinet approved of the building of the military hospitals, with the one proviso that the Repatriation Commission should be consulted about the plans. The chief argument had centred around the two large hospitals proposed for Sydney and Melbourne, but now at last it appeared to be settled.

A site for the hospital was selected on the Yaralla Estate at Concord, after much criticism, chiefly from the members of the medical profession on the ground of inaccessibility, though geographically it was central. The site at Heidelberg in Melbourne was found by General Downes himself at the end of February 1940. At the end of March 1940 the Acting Treasurer, Mr P. C. Spender, proposed to the Cabinet that in view of the importance of building hospitals that would be suitable for future use for war veterans, a special inter-departmental committee be constituted to report on the matter. It will be seen that protracted arguments and negotiations had one good effect, to help to establish the principle of building new military hospitals in Sydney and Melbourne which after the war would come under the administration of the Repatriation Commission. This principle was later extended to embrace the other capital cities. The committee comprised representatives of the Departments of Defence (Sir George Pearce), the Army (General Downes), Repatriation (Mr N. R. Mighell), the Treasury (Sir W. Massy Greene) and an architect, Mr O. A. Yuncken. It recommended the erection of permanent new hospitals of 600 and 500 beds at Concord and Heidelberg, and 240 bed hutted wards of temporary nature at both; in addition, a new hospital of 100 beds at Perth. The Cabinet adopted this report on 2nd May with a few changes.

General Downes objected to the long delay caused by the preparation of new plans, and doubted if the permanent buildings could be finished in nine months as the architect thought. He further maintained that permanent central services for the hospital should be erected, and that plans for complete permanent wards should be prepared while temporary wards

were being built. He also contended that 240 beds did not go far in supplying the needs which would soon become urgent. It was understandable that Downes showed impatience at continued delays, for by this time the hospitals project had been under review by at least eleven bodies and individuals. The Director of Engineering Services was also showing impatience, and complained to the Quartermaster-General that, although erection of military hospitals had been approved in November 1939, and the opinion of the army authorities was unchanged, nothing had been accomplished six months later. He estimated the cost of 3,000 temporary beds at £900,000 and of 150 permanent beds at £1,800,000. He thought that the chance of completing the "temporary" hospitals in 1940 was remote, and the permanent buildings would not be completed in less than two years. The recently formed standing committee of the service medical directors pointed out that by the end of July 110,000 troops would be in camp, and the air force, then 12,000 strong would shortly be increased to 15,000. Further, no provision had yet been made for battle casualties or for the needs of men called up under the universal training scheme, and no increase in the naval requirements had been included in the estimates. On 10th July the War Cabinet finally approved of additional pavilion wards in Sydney and Melbourne to bring the total to 1,200 beds in each city, at a cost of £390,000, 100 beds in Perth and equipment to cost £75,000. Work began on the temporary hospitals during July; it was found that only 1,000 beds could be provided on the Sydney site, and that there was no hope of completing these buildings during 1940.

In September, after the War Cabinet had approved of additional camp hospitals at a cost of over £200,000, the Chief of General Staff was able to assure the War Cabinet that adequate arrangements were in hand for the treatment of battle casualties in the Middle East, their transport to Australia in hospital ships, and their treatment in Australia. The number of beds required for the Services in Australia by the middle of 1941 was estimated at 3,600 with the addition of some 2 per cent of the air force strength, and an incalculable number from the navy. To meet this call 2,450 military beds would be available, with 1,243 beds in other hospitals; camp hospital beds should then total 2,835.

It was evident however that the matter was not yet settled. The other States had requirements which had not been met; in Western Australia for instance, naval casualties might be landed there for treatment, and the proposed 100 bed hospital was cancelled. On the 29th October a sub-committee of the Cabinet was summoned to discuss the position with Mr Spender, now the Minister for the Army. Recommendations were adopted for pavilion hospitals at Perth and Adelaide, and details of a new hospital at Brisbane were also discussed. Even now uncertainty was entertained in official circles whether the large permanent hospitals were really necessary. At this conference Mr Spender put the question directly to General Downes, who after brief hesitation said "Yes", and at last a firm decision was made.

The Cabinet finally agreed to the erection of a 200 bed hospital at Brisbane capable of expansion to 800 beds, a pavilion hospital at Daws Road at Adelaide of 150 beds expanding to 700, and a pavilion hospital of 200 beds at Perth capable of expanding to 400 beds. There was considerable discussion about the sites for these hospitals, resulting in further indecision and delay. By the beginning of 1941 a start had been made on all these hospitals except in Brisbane, where the site at Greenslopes was finally selected in January. Unfortunately through a serious error incorrect contours of the site were submitted to the architect; as the land was steep and the original plan for a pavilion hospital was not applicable, further delay was caused. Eventually a plan was adopted for Greenslopes in which buildings were planned at different levels. In Hobart the position was simpler, as the old block of the Hobart Hospital was used; in Launceston beds were available in the civil hospital.

In the Northern Territory a hospital was needed at Darwin, obviously a town of great strategic importance. Difficulties were encountered in obtaining a military hospital site in the Darwin area, but by the middle of 1940 the position was eased by the vacation of the Bagot Compound. Here temporary hospital accommodation was required, and in the meantime the resources of the Kahlin Civil Hospital were used. After many delays the army at last had a hospital for 150 patients in the Bagot area, in December 1940, and planned a building of more permanent type at Berrimah 11 miles inland, and also accommodation for sixty beds at Adelaide River. An area was also selected in Moresby, and at the end of 1940 plans were ready for a hospital there on a rather steep but suitable site.

The work of building these hospitals was carried out under direction of the Department of the Interior. Thus closed this phase of base hospital development in Australia. It should be noted that the focusing of so much attention on these hospitals was partly responsible for the great development in the number, and size, and excellence of equipment of camp hospitals. From being camp dressing stations, they graduated to a high standard of medical and nursing equipment and performance. Their work was greatly helped by the influence of the A.I.F. medical units waiting to proceed overseas.

A battle of principle was waged, chiefly over the two permanent hospitals at Concord and Heidelberg, and the outcome was that the medical services of the army, navy and air force retained continuity of attention by their own staffs of servicemen and women. Criticism was freely levelled at projects which were considered extravagant by some, but all the accommodation provided, after such prolonged effort, was needed, and the value of these fine permanent hospitals has beyond question justified the cost. Time has vindicated the judgment of Downes and his staff.

HOSPITAL SHIPS AND AMBULANCE TRAINS

By the end of July 1940 one hospital ship had been commissioned and equipped. This was the *Manunda*, a motor vessel of 9,115 tons, capable

of carrying 332 invalids; and in emergency 400. Delay was caused in the refitting of this ship by a strike of engineers, but by September 1940 the ship was staffed and ready to sail. Lieut-Colonel J. D. Galbraith, who superintended the equipping of the ship, laid down a number of general principles guiding the selection and fitting of a hospital ship. The most useful size was 10,000 tons, which allowed the ship of average draft of up to 26 feet, to go alongside most wharves. Passenger ships were found better than cargo ships, as the deck space, galley and dining saloon accommodation are more extensive. Speed should average not less than 14 knots; steam power is convenient for autoclaves, *et cetera*, but diesel plants allow a greater range and provide ample electric power. Water capacity is apt to be a problem. In warships, where water consumption is controlled, about 22 gallons per person per day are required, but in hospital ships the requirements are not less than 30 to 35 gallons per head per day for all on board, allowing an extra day per week for laundry. Distillation plants usually produce only a restricted amount of water, except in diesel ships which can use the exhaust heat for this purpose. Galbraith points out the great advantage in planning for adequate stairways or ramps leading to life-boat stations; for this it is useful to prepare a plan of longitudinal section showing all exits. Refrigeration or facilities for ice-making is a necessity. Life-boat accommodation must be greater than for a liner, as invalids need more room than others; Carley floats and rafts should be at least 50 per cent above normal passenger ship requirements.

The ward accommodation needs careful study; except for short voyages 40 per cent of the cots should be single tiered, as nursing in upper cots is difficult. Swinging cots have disadvantages, and if used for orthopaedic cases, should have a fixing hook. Special wards are needed for infectious cases, for tuberculosis, for venereal disease, though venereal patients were seldom carried on hospital ships, and also psychiatric cases. Observation cabins for mental patients are necessary, and also well ventilated padded cells though these are very seldom used. Many patients with neuroses can be carried in ordinary wards; others are preferably kept in a quieter environment. Ventilation is important, and the ship is more useful and comfortable if running under climatic conditions for which it was constructed. Ample office space is required for the staff.

Special gear must be installed for sterilisation of instruments and sanitary appliances; the allowance of lavatory seats should be 5 per cent, and showers should predominate over baths, as they conserve water and labour. The operating theatre is satisfactorily placed on the promenade deck about midships. Ships fitted in Australia have included in the theatre layout the operation room, a plaster room, X-ray room, and sterilisation and preparation room. Only simple laboratory equipment is necessary such as used in ordinary side-room work. Good space and adequate equipment are needed for physiotherapy, each therapist should have two tables for simultaneous use. A dental department is also needed, with good artificial lighting and a small workshop. Kit storage is important on a

hospital ship; easy access and orderly arrangement are desirable. Dietary problems are simplified if a limited number of diets, say four, are standardised.

Details of administration need not be given here; standing orders, as for any important medical unit, were approved for the use of hospital ships. The general organisation was based on a distinct demarcation of responsibility between the different services involved. The navy controlled the movement of hospital ships, particularly with regard to safety; the mercantile marine was responsible for navigation and all general management of the ship and crew, and the army controlled the discipline and allotted the duties of the hospital ship unit, maintained discipline of the patients, and controlled and carried out their treatment. As in a general hospital the medical and surgical specialists on board were responsible for the details of treatment and the commanding officer was in charge of the military unit as a whole.

A clear cut plan for embarking and disembarking patients was always adopted, and rehearsals of the drill were held. A very satisfactory standard of efficiency was attained by the staffs of hospital ships. One *sine qua non* was an experienced medical officer who could make prompt decisions as to the disposal of each patient.

Ambulance trains were also fitted up in the various States. Two, or in some instances, three tiers of berths were installed, but in hot climates there is considerable difficulty in maintaining ventilation unless there is ample air space around the berths.

A war establishment was drawn up for ambulance trains, modified later according to needs and changed circumstances. No stretcher bearers were provided as such; the patients were moved by the army staff of the train. A medical officer was attached to a train, and was responsible for the care and discipline of the patients. Lack of standard rail gauges in the various States caused considerable inconvenience and delay. Trains varied in internal construction also, and special drilling of the staff was necessary to ensure prompt movement and gentle handling of patients. The attachment of nurses to ambulance trains added greatly to the comfort of patients.

Various difficulties arose. Economy of running at a time when coal was precious was important, but the sending of an empty train over long distances was sometimes unavoidable. Trains would sometimes remain unused for considerable periods, during which maintenance staff was needed. Hygiene and sanitation presented difficulties, particularly when trains were standing for periods, especially at stations. The housing and accommodation of staff required special attention, so too did the problems of feeding patients. For example on the first trip of the 2nd Ambulance Train from Sydney to Albury, the staff consisted of the officer commanding the train, three nurses, and twenty-four A.A.M.C. O.Rs. Rations were carried to provide four meals for the staff and two for patients, and reserve rations for all for three days. Early experience showed that

additional arrangements for dish washing and flushing bed pans were required.

Standard specifications were drawn up to apply to ambulance trains in each railway system. All material and equipment were usually supplied by the railway, except wire mattresses, bedding, and utensils for ward cars, and medical and consumable stores which were supplied by the army. Warming and lighting gave rise to some difficulty, as electricity supply was limited, especially when the train was stationary. This was overcome by the installation of additional diesel generating plants. The standard stretcher used measured 7 feet 9 inches, by 1 foot 11 inches by 6 inches overall; these stretchers could be manipulated in a central passage of 2 feet 6 inches; turning was done at the entrances. With the cooperation of the engineers of the railway systems ambulance trains underwent considerable modification as time went on, and operated successfully often over long distances.

RAISING OF MEDICAL UNITS

Some of the problems connected with the raising of medical units have already been mentioned in Chapter 2. As far as possible medical officers were not brought into camp until they were actually required. This applied particularly to the more senior officers, who were allowed to continue working in the civil community until their services were more valuable in the army. In the field units training was preferably begun early, and the establishments of field ambulances were filled as soon as convenient. General duty officers were required for ordinary routines with combatant units, and for camp hospitals and dressing stations, and other medical officers for purposes of administration. As already pointed out, the value of a large medical unit in a large camp area was undoubted. There was a twofold advantage if a well staffed general hospital could take over the running of a large camp hospital for a period; the patients benefited by the services of a highly skilled staff, and the hospital benefited by gaining cohesion and experience in military procedure. In all centres efforts were made to instruct medical officers in responsibilities which were, in the administrative sense, new to them. Schools were also arranged so that medical officers arriving in the Middle East would be familiar with the standard military problems and also those special to the country.

After the sailing of the first convoy of troops in January 1940 more time was available for the assembling of equipment, and staffs of medical units realised that they themselves had certain responsibilities in seeing that they received their correct issues of all kinds of supplies. This was particularly important in connection with material of a technical nature, such as instruments, drugs, dressings, and the equipment of special departments.

Finally something may be said about the provision of the technical departments of the larger medical units, in particular those of pathology and radiology. Problems of supply are dealt with in the sections on equipment. There were considerable difficulties in assembling adequate supplies

of approved types of equipment for such departments as the ophthalmic, ear, nose and throat, physiotherapy, and some items required by special hospitals.

Pathology departments had to face shortages of some special material, particularly glassware, and, what was more important, shortage of pathologists. Colonel C. H. Kellaway reported to General Downes early in 1940 that not many pathologists were available without encroaching on the requirements of the civil community. By June 1940 medical officers for this work could be provided for each hospital and C.C.S. then being raised, but it was evident that more men must be trained. Plans were well on the way for a mobile bacteriological laboratory housed in a specially designed motor vehicle. A register of pathologists was prepared, showing those available for service at home and abroad. Meanwhile much useful work was carried out in Australia on important subjects such as blood typing, preventive inoculation, and sterilisation of catgut. It was found necessary on mobilisation to call up pathologists and technicians as part of the staffs of hospitals to meet the needs of training camps. Others needing further training were seconded, but great difficulty was found in inducing enough members of the medical profession to undergo training. It was evident at this stage that men of promise were often keen to go overseas with the A.I.F., and that without some degree of control it was hard to keep them in Australia, even for special training.

The radiological advisory committee, enlarged from a sub-committee of the Victorian Branch of the B.M.A. assisted General Downes in a number of matters. It consisted of Dr A. Mackay, Dr J. V. O'Sullivan, Dr F. Stephens, Dr Stuart Cross, Dr C. E. Eddy, and, later Dr T. Nisbet, and was responsible for selecting the "Ultrays" apparatus for use in the field. This proved robust and satisfactory, though some radiologists were inclined to judge it by the standards of more elaborate equipment used at home. A portable outfit was also selected for use in general hospitals. Useful investigatory work was carried out from time to time by Dr Eddy, especially tests on apparatus the subject of enquiry or complaint, and reports on films recording the amounts of radiation in X-ray departments. Dr Eddy also later prepared specifications for a machine suitable for superficial therapy. There were occasions when the advisory committee felt that its advice would have been helpful, for instance in the provision of equipment for hospital ships and for base hospitals. At a later date when an adviser in radiology to the D.G.M.S. had been appointed, the committee cooperated with him if required in an advisory capacity.

CHAPTER 5

PREPARATIONS IN THE MIDDLE EAST, 1940

ON 15th December 1939 the staff of an overseas base embarked from Australia and early in January 1940 this base was established in Jerusalem, the first elements of the Second A.I.F. to reach Middle East. Colonel H. C. Disher, A.D.M.S. of the overseas base received full and friendly cooperation from Colonel D. T. M. Large, R.A.M.C., who was British D.D.M.S. in Palestine. Large had prepared an appreciation of the medical situation and plans for the medical care of the Australian force, which was submitted to Disher for his concurrence. It was expected that when the remainder of the 6th Australian Division arrived the strength of the force would be about 20,000. This was to be disposed of in six tented camps from Gaza to Qastina along the coastal road running north. On a basis of a sick rate of 0.3 per cent a total of 900 beds would be required which could amply be supplied by the 2/1st and 2/2nd General Hospitals coming with the division. The immediate plan provided for the establishment of the 2/1st A.G.H. at Gaza Ridge near Gaza, and pending the preparation of this hospital, camp hospitals could evacuate patients to the British general hospitals at Sarafand or Jerusalem. It was suggested that in emergency the civil hospital in Gaza and the Hadassah Hospital at Jerusalem might be used, but this was never necessary, though the latter gave great assistance later by making available the services of some special departments, such as X-ray therapy. The resources of the hospital of the Church Missionary Society at Gaza were also used through courtesy of the Chief Medical Officer, Dr Hargraves.

In general the Australian policy was that Australian patients should be treated as far as possible in their own hospitals. As there would be another general hospital and a casualty clearing station available when the second convoy of the A.I.F. arrived, it did not seem likely that the second hospital would be employed as an entire unit for some time after its arrival. The only difficulty in the plan was the question of ambulance transport, for which it was necessary to use R.A.M.C. ambulances until motor ambulances should arrive from Australia. Ambulances were placed on loan for this purpose at the principal camps. Colonel Large requested that all deficiencies of equipment and supplies should be notified, and that estimates should be made of the needs of medical units. A lag of one month was allowed for the time necessary for producing supplies from Egypt.

By the time the first units of the Second A.I.F. arrived in Palestine, in February 1940, arrangements had been made for their reception. On 13th February the 16th Brigade began to disembark at Kantara, so familiar to the First A.I.F. in Egypt. The entry of the Second A.I.F. into Palestine was very different from that of the First A.I.F. In March 1917 the Anzac Mounted Division of the First A.I.F. groped through fog to participate in

the first battle of Gaza, but the advance units of the Second A.I.F. made their entry peacefully by train from Kantara under a cold wintry sky. Heavy rain had fallen just before their arrival; indeed it was doubted if tents could be pitched and other arrangements completed in time. However, despite muddy ground and meagre comforts, hot meals were ready, prepared by friendly British units, and the 16th Brigade soon settled in camp.

Local conditions in southern Palestine were favourable. Racially and politically the country was quiet, though there were known areas of unrest. The Australian troops were well received by all parties. Within a fortnight of the arrival of the first flight of the Second A.I.F. temporarily unsettled conditions arose owing to feeling over the ratification of the British White Paper of 1939, and it was necessary to cancel leave for security reasons. Occasional isolated incidents occurred in the early months, but it was soon possible to relax the precautionary measures, which included limitation of movements even on permitted roads to daylight hours, and the carrying of arms in all parties.

FEATURES OF THE COUNTRY

The diversified climate of Palestine exposed the men to considerable cold and periodical heavy rain during the winter months, and to intense persistent heat in the summer. The "khamsins" were unwelcome with their unpleasant gale force and their blinding dust, but did not have the severity of the awful dust storms of the Western Desert. The only potentially serious disease likely to cause high sick wastage was dysentery. The northern part of Palestine contained some highly malarious regions, as the A.I.F. learnt by personal experience later, but except for some endemic areas needing supervision, the southern portions occupied by the Australians were well controlled. Tribute must be paid to the civil administration, whose health services effected striking improvements in the hygiene of a country which had remained primitive during the centuries of Turkish rule before the 1914-1918 war. The scientific influence of the Hebrew University of Jerusalem and the efforts of Jewish settlers in some of the northern parts of Palestine also did much to raise the standard of hygiene. The habits of the poorer element of the Arab population favoured fly breeding and the dissemination of bowel-borne disease. Ankylostomiasis and schistosomiasis never proved a danger in Palestine. Sandfly fever was a minor scourge during the summer months. Rabies was endemic, occurring both in dogs and in the jackals whose nightly howling earned them unpopularity in the camps.

During the 1914-1918 war, water supply was a problem in some places, but the deep wells which have been used with success in irrigating citrus orchards gave very satisfactory supplies. The nature of the soil in most of the camps was such that sullage water was not readily absorbed, and special measures were needed for its disposal. Instructions were promulgated at once to all ranks, but in particular to medical officers, informing them of the possible hazards to health and of the customs of the country.

Cautions were given to all ranks about the risks of eating unwashed fruit or vegetables, and care was taken to see that these were immersed in a weak solution of permanganate of potash before use. As might have been expected, not even the plainest speaking would always deter soldiers from buying fruit surreptitiously by the wayside and eating it on the spot. It is upsetting to catch patients convalescent from dysentery bargaining with Arabs for forbidden fruits over the boundary wire, but such is human nature.

EARLY MEDICAL ARRANGEMENTS

In the first few months a great deal of work had to be done by the medical pathfinders. The medical units available were the 2/1st Australian General Hospital, 2/1st Field Ambulance, 2/1st Field Hygiene Section and the 2/1st Convalescent Depot. Camp reception stations were established in the chief camps and facilities were extended for the holding for a few days of mildly ill men who did not need hospital treatment.

The 2/1st A.G.H. under the command of Colonel J. Steigrad, fostered by the 1st Hampshire Regiment, found a hospital site with well made and drained main roads and buildings erected for kitchens and messes, ablutions and latrines. Most of the area consisted of ploughed fields, on the tenacious mud of which the members of the unit proceeded to erect tented wards. The staff had been hastily assembled shortly before departure from Australia, and knew little about such matters, but soon learnt through a process of self-education. Reviews by Mr Anthony Eden and General Sir Archibald Wavell, though most stimulating, were somewhat of a military ordeal to medical units with little formal training in drill.

A camp hospital was established at once and within a few weeks all types of patients could be handled, except those requiring full investigation or surgery. By the beginning of April extemporised accommodation in a mess erected for the 2/2nd A.G.H. was used for an operating theatre and for a pathological laboratory. X-ray work was delayed by serious damage sustained by the plant in transit, but before long, temporary quarters were found in a building that was much more useful for this purpose than that for which it was designed, a sick officers' mess. Delays in planning and erecting a quite elaborate operating block led to the trial of a mobile operating hut of French design. This had the advantage of being prefabricated, and could be taken down and packed for removal, but was not thought suitable for a general hospital sited in an exposed and dusty environment, and was not used.

Important sanitary problems had to be solved, particularly in relation to a dysentery ward. Flywire was almost unprocurable, and it was not possible to make wards flyproof, even when an excellent type of hutted ward was built. Sanitary annexes for tented wards were at first only small tents: later annexes were built integrally with the wards, and later still when stringency in building materials made tented wards again necessary, separate hutted annexes were provided. A device found to be educationally and hygienically useful in these wards was to cover all door

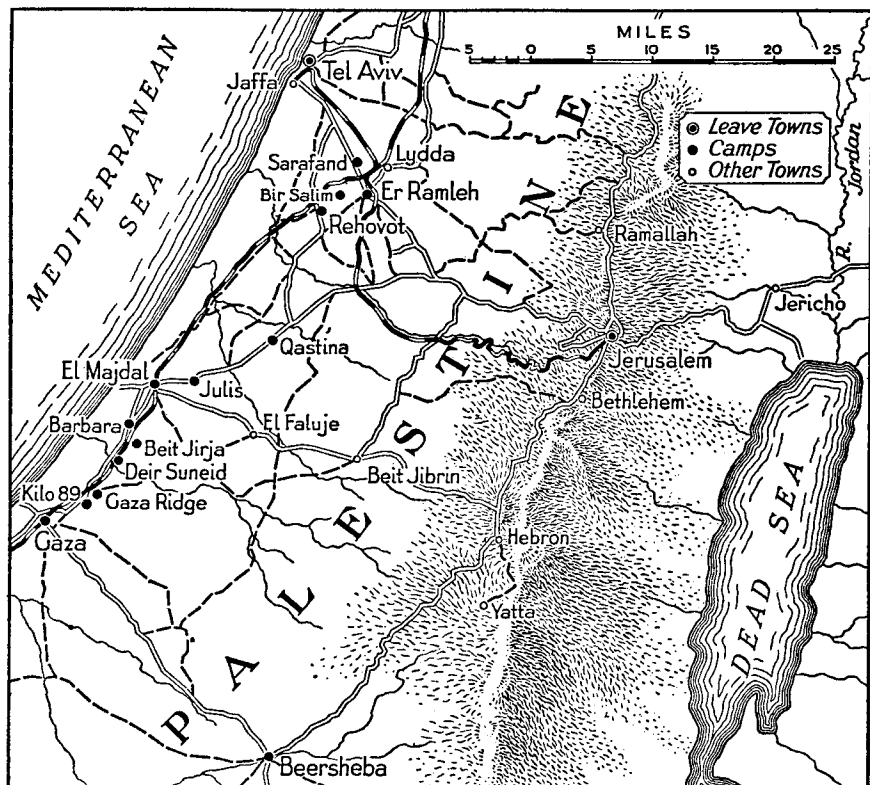
handles and other fittings likely to be handled, by cloth kept moist in an odorous antiseptic solution such as lysol or cyllin.

Otway pits, valuable for general purposes in Palestine, were also useful in hospital areas, but the ideal method of disposal of excreta in hospital was incineration, using an incinerator of a type introduced by a New Zealand hospital in the 1914-1918 war. Flyproof boxes were used for the storage of bed pans. Used pans were placed in one box, and removed by an Arab sweeper, who burnt the faeces with sawdust in a home-made incinerator, flushed the pans in 3 per cent cyllin, boiled them in a Soyer stove and finally replaced them in the clean box. It was assumed that the menial who performed this lowly office was immune from infection. The supply of sawdust failed after a time, and boiling was carried out in an open mud fire place using sump oil and water in a flash burner. Later a special boiler and burner were obtained by local supply. Specimens of faeces for inspection were kept in small containers, usually cigarette tins and specimens for microscopic and bacteriological investigation were sent to the pathologist in closed wax paper cups. Modifications of these methods formed the bases of the routines followed in all units holding patients with dysenteric and similar diseases. It was later found by experience that a deep trench latrine could be used safely for disposal provided the flyproofing was adequate. The experience gained by all the A.I.F. hospitals in Palestine and Egypt was most useful and was helpful in producing the design ultimately accepted as standard for dysentery wards and annexes. It was found that with due care even a tented dysentery ward need not present any risk of spread of infection; the staff, if well trained, were probably exposed to no greater risk when on duty than in the presumed safety of a mess.

The 2/1st Field Ambulance under Lieut-Colonel A. J. Cunningham camped at Qastina and at once began ambulance training. Considerable assistance and stimulus were obtained from training tests with the officers of the 168th British Cavalry Field Ambulance. In May, on the arrival of the second convoy from Australia the unit moved to Julis, where special training was begun in nursing procedures, with the help of nurses from the 2/1st C.C.S. The 2/1st Field Hygiene Section under Captain R. Drummond also camped at Qastina, and found much to do. The native quarters in contractors' camps were bad from the sanitary point of view, and the hygiene of kitchens and butcher shops in the battalion lines of some camps was unsatisfactory. The unit constructed samples of various hygienic devices, and began to build up a hygiene museum at Deir Suneid, which was found to be most useful in training. The 2/1st Convalescent Depot, commanded by Lieut-Colonel L. G. Male, began planning the unit's activities, and inspecting sites; finally an attractive site with good diversional facilities was chosen at Kafr Vitkin on the coast of North Palestine.

A difficulty arose in connection with the early administration of medical affairs. Colonel Disher as A.D.M.S. overseas base naturally worked in close association with the other members of that formation in Jerusalem.

Brigadier Allen commanding 16th Brigade kept in touch with local medical affairs in the camps through Major N. H. Saxby, acting as D.A.D.M.S. A certain lack of full liaison was inevitable until later when Disher was able to work from brigade headquarters. No difficulty would have been experienced had a clearer indication been given at the beginning that the A.D.M.S. of the overseas base would also act as the senior medical officer and adviser of the force when the first brigade arrived.



Palestine camps.

By 18th May there were 228 patients in the 2/1st A.G.H., but in a few days the figure rose to 430 when the second convoy of the A.I.F. arrived, bringing a good proportion of the remainder of the 6th Division. This mild test of powers of expansion was made rather sharper by the fact that this coincided with the laying of concrete floors for the wards, which necessitated moving all the wards to other areas. By the middle of June there were three brigades and attached Australian troops in Palestine, with an average daily strength of 13,500. The average daily sick rate was 3.6 per cent, and the average daily hospital admission rate 0.25 per cent.

EARLY ORGANISATION

The commander of the Australian force in the Middle East, General Sir Thomas Blamey, arrived on 20th July by air with his staff, which included Colonel S. R. Burston as D.D.M.S. Colonel Disher now became A.D.M.S. of the 6th Division which was commanded by Major-General Iven Mackay, and Colonel Burston as D.D.M.S. Corps was promoted brigadier. Some difficulty was caused by the necessity for diversion of one part of a convoy of Australian troops to England, in addition to a forestry unit sent to the north of England. With these troops was the 3rd Australian Special Hospital, and from the staff of this unit, with various additions was built up a general hospital, the 2/3rd Australian General Hospital, which worked as such for the period of service of these troops in England. This is described in Chapter 6. The A.I.F. in the Middle East was thus unexpectedly deprived of some of the medical staff which might have been absorbed in work in Palestine or Egypt. It was regrettable too that much wanted equipment brought from Australia by an advanced depot medical stores originally bound for the Middle East, was now in England, pending opportunity for return to its correct destination.

Under the changed conditions the I Australian Corps took over the administration of the base medical units, the 2/1st and 2/2nd General Hospitals, the 2/1st Australian C.C.S. and the 2/1st Convalescent Depot. It was necessary now to raise a new advanced depot medical stores, as the 2/1st A.G.H. was in the position of acting as advanced depot medical stores not only for one brigade group as heretofore, but for three brigade groups with six camp hospitals and two field ambulances. Major N. W. Francis, who had been in charge of the Venereal Disease Annexe in the 2/1st A.G.H. was placed in command of the 2nd Australian Special Hospital, raised to replace the 3rd A.S.H. diverted to England.

The establishment of the headquarters of the I Australian Corps and the 6th Australian Division in the Middle East coincided with a momentous period. The day after the second convoy arrived in Palestine, the Nazi forces were streaming across the Meuse, and Holland had already capitulated. The Australian division hardly more than equalled in numbers the casualties evacuated from Dunkirk; more than twice as many people were killed in Rotterdam alone. Italy now entered the war and it was evident that the Middle East would be more than a training ground for an European adventure; it was to be a battleground. It was of interest to medical observers to see the effect of these events on the spirits of men in an army hospital, where many of the inmates regarded their physical misfortunes either as a temporarily annoying or depressing episode or as providing temporary haven from the rigours of military training. The German sweep across Europe caused some depression, but the incredible retreat from Dunkirk was a great stimulant. Italy's declaration of war on 10th June was welcomed as bringing closer the day of actual participation. It was noticeable that far more forebodings were caused by the fall of Paris, which at once introduced a feeling of instability as to the future of

Syria. These were but brief, however, and enhanced the realities of work and training.

One immediate local effect of the declaration of war by Italy was the imposition of a black-out in Palestine. On moonless nights movement about camp areas which were still under construction or expansion was distinctly hazardous, and in a tented hospital the difficulties of work were intensified. The profusion of ditches, trenches, mounds and heaps of building materials in the camp areas stimulated agility considerably, but also produced numbers of injuries, particularly at night. Traumatic affections of the knee joint at this time were almost solely due to falling into gutters and trenches and to injuries received in sport.

The reorganisation of the Australian forces now began on an expanded scale, as it was expected that by the beginning of 1941 a full corps would be in training in the Middle East. The preliminaries were over; the next phase had begun. This was evident from the air raids on Haifa, the isolated attacks on Tel Aviv and more significantly the Italian occupation of Sidi Barrani, well within the Egyptian border. The British had also evacuated British Somaliland following invasion by the Italians. The general tempo of the war was quickening, for by the end of August London had suffered the first all-night air raid. Soon after this the 6th Australian Division moved to Helwan in Egypt to complete its war equipment and further training.

TRAINING

In medical units training is of several kinds; members of the staff may be trained in technical or administrative procedures, partly by routine experience or by organised instruction, and specially trained instructors may be used to educate members of other units, either medical or non-medical. During 1940 all opportunities were taken to use the full resources of the medical units for teaching purposes. It often happened that medical officers were employed in work of a kind somewhat remote from their professional interests, but though the needs of the service had to come first, they were encouraged to make contact with other branches of work when possible. The professional standard of the medical services was high, and on the staff of all the medical units were medical men of established reputation as consultants and teachers. General hospitals were encouraged to discharge the important function of higher medical education, which always reflects favourably on the standard of practice within a hospital. Brigadier Burston, D.D.M.S. of the I Australian Corps, and the A.Ds.M.S. of the three A.I.F. divisions gave every help and encouragement to these professional activities.

In addition to the holding of staff rounds in the medical and surgical divisions, the staff of the 2/1st A.G.H. arranged series of demonstrations, and medical officers from other units were given facilities for attendance. Clinical meetings were held at hospitals, organised on the usual civilian hospital lines. After the arrival of the 2/2nd A.G.H. in May 1940 an Australian hospitals' clinical group was formed and on 13th July 1940

a highly successful clinical meeting was held at the 2/1st A.G.H. This had some far-reaching results. It was attended by the D.D.M.S. Corps, the A.D.M.S. 6th Division and forty-six British and Australian medical officers. Guests included Professor Adler, protozoologist from the Hebrew University of Jerusalem, and Dr Rachmilewicz, senior physician of the Hadassah Hospital, Jerusalem, and a number of other senior practitioners from Tel Aviv. Great assistance and cordial cooperation had already been given by these medical men, some of whom had organised special courses for medical officers, and further evidence of their interest was afforded after this meeting by the offer of Dr Jassky and the governing body of the Hadassah Hospital to hold monthly clinical meetings at that institution, to which all British and Australian medical officers were invited. These meetings became a regular feature of the service medical life of Palestine; transport was made available for as many officers as practicable, and the gatherings were looked forward to as combining hospitality under ideal conditions and a high standard of post-graduate instruction from a distinguished staff. The attachment of numbers of Australian medical officers to British army hospitals for duty during the earlier days of the Middle East work resulted in acquaintance of many colleagues in R.A.M.C. and A.A.M.C. to mutual advantage, and these contacts were renewed and strengthened by such meetings.

In addition to these hospital educational activities opportunities were afforded where possible for medical officers to attain such further experience as might equip them for special work. As more work was required of medical units these opportunities became fewer, but an army career in medicine and surgery has proved most stimulating for many medical officers. While many of them were by necessity forced to occupy themselves in routines requiring little specialised knowledge, many also equipped themselves for future days of civil practice. Regrets were sometimes felt by medical officers who were engaged in administration and thought that they were losing in the clinical field. This could not be helped; at least they gained in general experience in the handling of men and affairs and there were often opportunities of promotion.

The technical medical and surgical training of orderlies and other lay assistants was a most important function of all medical units holding patients, from camp hospitals upwards. More will be said of this later, but it may be pointed out that it is absolutely essential that those capable of giving instruction, both medical officers and nurses, should regard this duty as most vital.

Schools for medical officers in many subjects were begun early. A school in tropical medicine was held even during the busy weeks of preparation at the close of 1939 at the School of Public Health and Tropical Medicine in the University of Sydney. This work was continued on all the transports carrying troops to the Middle East. As far as possible medical units travelled together, though the need for appointing experienced medical men as senior medical officers of transports prevented the entire realisation of this ideal. Lectures and discussions were

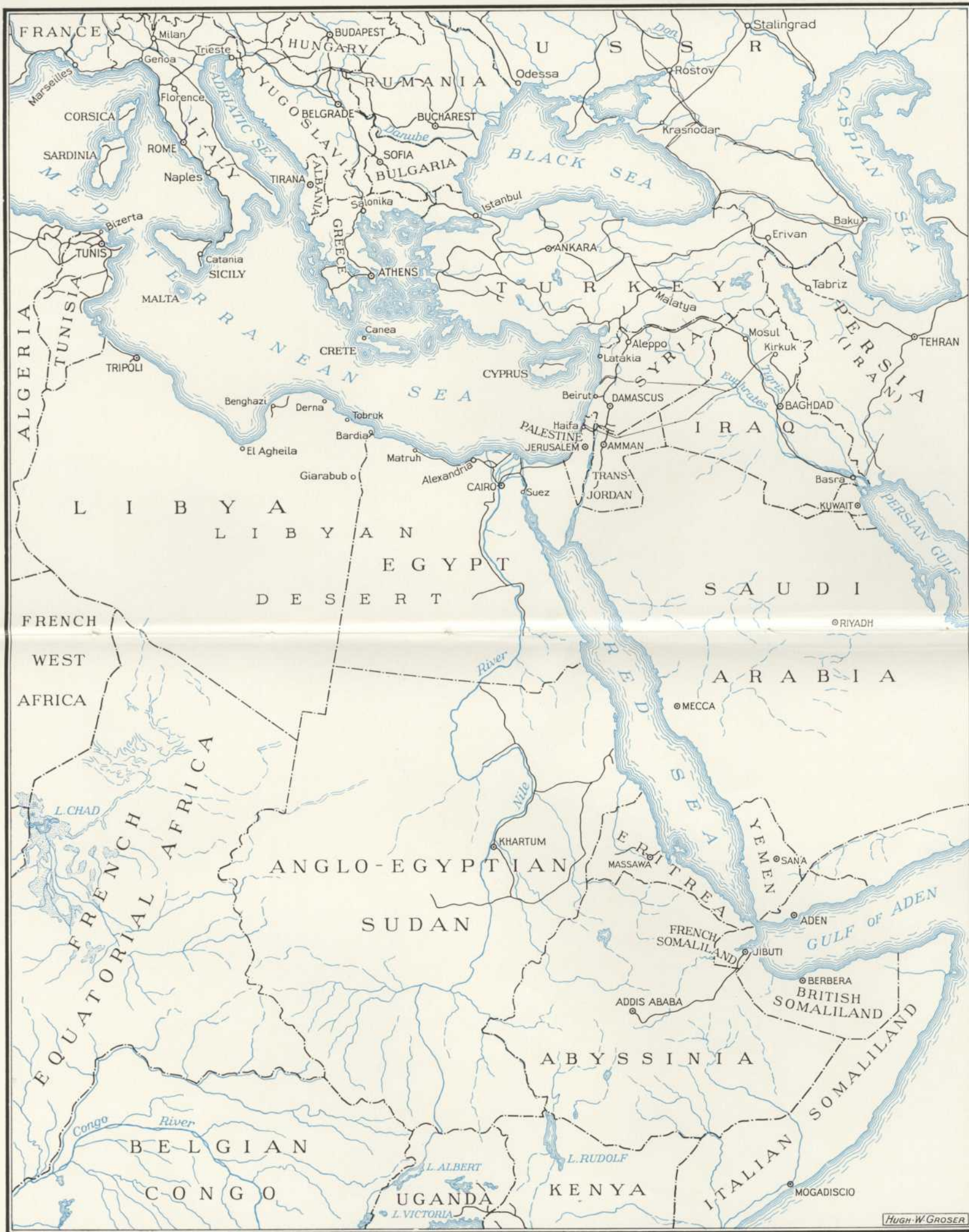
held every day for all ranks, though possibly their value was sometimes reduced by the competing noises of a windy deck, or the somnolent weather of the tropics.

The value to men and officers, after their arrival in Palestine, of practical courses in hygiene was increased by the assistance of the experts of the Hebrew University, the Hadassah Hospital, and the Palestine Department of Health. Field work was included in the schools as far as practicable. During 1940 and 1941 the schools held for medical personnel covered a wide field, including the diagnosis of malaria and dysentery, malaria control, water duties, disinfection, sanitation, administration, pathology, tropical diseases, rabies, chemical warfare, passive air defence, chiropody, blood transfusion and resuscitation, physical training and cookery. Special courses of training in staff work were also arranged, particularly for officers likely to be engaged in administration. Colonel Disher pointed out that there was a dearth of trained instructors who could help to improve the standard of practical knowledge of officers in field ambulances; that militia experience was not enough and that more training in the conditions of warfare was required.

HOSPITAL ACCOMMODATION

During 1940 most patients were treated in the 2/1st A.G.H. The 2/1st C.C.S. held a limited number of patients, and carried out a small amount of surgical work, which was instructive from the viewpoint of training the staff. However, this unit had no settled abode for long and only began to exercise its real functions at a later date. The 2/2nd A.G.H. of 1,200 beds was only able to move the main body of the unit to its site at Kantara on 15th December 1940, and began to take patients on 29th December.

The building of hospitals presented difficulties. Tentage had not been brought from Australia, and, though it was available in the Middle East the most suitable types, such as the large hospital marquees, were scarce. E.P.I.P. tents, largely used for personnel, proved admirably adapted for this purpose. In some instances concrete floors were supplied, as for the use of nurses. These tents were used also for accommodation of the sick, either singly as for sick officers and nurses or for isolation purposes, or "brigaded". Many variants of method were used for brigading. The double walls and roofs make these tents very comfortable, but it is hard to exclude the weather when they are erected in series, though this may be fairly satisfactorily done if the overlap is drawn tight and lifted some six feet from the ground by taking ropes from the lower cross pole through the ventilators at the end of the tent. Brigading of this useful tent may be done side to side also, which leaves a corridor unobstructed by poles. Large hospital marquees were usually supplied for main wards, and these make good wards especially if on a concrete base, though in Palestine the earth could be rammed down or even trodden in to make a good surface. Where concrete floors were approved it was found a great advantage to have the floors ready first. The 2/1st A.G.H. for example, had the



experience of removing all its tented wards while the floors were laid, and then of shifting them back again during a period of rapid expansion. Later again the whole hospital had to be moved temporarily while hutted accommodation was built. Hospital marquees are not so well ventilated as the expanding hospital tents, though these were not readily available, but by rolling back the sides of the tents the prevailing breeze could be used for cooling and lighting was improved.

Black-out conditions are trying at any time, but especially so in tented wards, though with careful policing the ends of efficiency and security can be reasonably met. Passive air defence requirements were met by sinking personnel tents some two feet and adding an earth revetment. This could be done only in the summer, but fortunately it is possible to forecast the onset of the wet season accurately in Palestine, and surface dwelling was resumed in the winter. Tented wards usually had their permanent floors on ground level. Protection was given to the wards in the event of air raids by sand bags in some places, but as bags were scarce it was easier to build walls of mud bricks, which were simply made after the Arab fashion, the local tenacious soil being used with stubble as a binding agent. Mud brick construction was also found convenient for other buildings, such as sanitary annexes.

When permanent hutted wards and other buildings such as offices and medical inspection centres were built material was at first a problem in Palestine. Excellent wards were, however, built of light silicate brick up to window level, and the wall panels were made of plaster based on wire mesh. Floors were concrete in some cases, but very good floors were made of local cement tiles laid on sand. Medical units had no electric generators at that time, but local supply proved adequate, and even the tented wards had electric light. Requisition was made for fans, and British Force approved a tropical scale which proved very generous, once the necessary fans were produced.

Heating was always a problem in the wards. The "primus" type of wickless kerosene stove was useful, but when only two of these stoves were available for heating water for washing and sterilisation in a ward of seventy to eighty patients great inconvenience was caused. Fortunately many of these men were more or less ambulatory. Immersion electric heaters were available later and proved useful. The use of the "primus" stove in Palestine was also somewhat hampered by the scarcity of methylated spirit and of spare parts. Stoves of the "Coleman" type were used for a time and worked well, provided they were not handled roughly, but spare parts were lacking and unleaded petrol became unobtainable. Wood fuel was so scarce that its use in the open was not possible. "Butagaz" supplied in steel containers proved an excellent fuel for cooking, as an ordinary gas range could be used in the kitchen: it was also used for ward purposes. The cylinders came from Egypt, and had to be sent to Haifa for charging, as the gas was produced there. Later enemy action limited the output and some of the older methods were resumed perforce.

Hospitals in the base areas were not widely dispersed. Originally this was intended, but the great expansion that took place in hospitals made closer settlement imperative. Hospitals like the 2/1st and 2/6th A.G.Hs., originally of 600 beds capacity, were later running hospitals of 1,500 to 2,000 beds, the 2/2nd A.G.H. and the 2/7th A.G.H. also expanded well beyond their nominal capacity of 1,200. In addition the Gaza Ridge area where the 2/1st A.G.H. was situated, housed also another hospital medical staff and sometimes two, during periods of inactivity, and at times the nurses of as many as three hospitals also had to be accommodated. Under these conditions dispersal was not very practicable. At Kantara on the eastern bank of the Suez Canal the 2/2nd A.G.H. should ideally have been dispersed, as it was in a target area, and raids occasionally came close to its boundaries. The desired degree of dispersion was however not possible owing to the shortage of water piping, which imposed a limit on the distances between buildings. Similar shortages in building materials affected hospital policy in other ways. It may have seemed contradictory for Australian patients to be in the British and New Zealand hospitals when the declared policy was for them to be treated in Australian hospitals, and especially when staffs and equipment were available, but stringency in building supplies, unavoidable delays and unexpected movements raised difficulties that were hard to surmount.

Experiments were tried with various designs for wards. A sanitary annexe was built with each ward. In the Palestine pattern the annexe was the vertical limb of a T shaped plan. In the 2/2nd A.G.H. the annexe was built between the two halves of the ward, but this was found to be a disadvantage as it meant more work for the nursing staff. These early trials helped towards the adoption of standards in the later years of war.

Theatre blocks were constructed for the hospitals so that work could go on regardless of weather conditions. These were costly. The cost of theatre buildings at the 2/1st A.G.H., which allowed two major operations to proceed simultaneously and included a plaster room and the X-ray department, was estimated at £4,500. But, as was pointed out at the time, why hesitate when camp cinemas, built of silicate brick, cost £3,000 each and camp hospitals £1,500? Pathological services were housed in a separate building large enough to allow for the various branches of work and sterilisation of glassware *et cetera*. Largely through the insistence of orthopaedic surgeons the importance of physiotherapy was rightly recognised, and efficient cubicled space was allotted for this work. Equipment was meagre at this stage, and often extemporised, but the foundations were laid for a greater employment of physical and occupational therapy.

Camouflage was ordered in hospital areas, but the pigments laid down in the original instructions for tents were not obtainable, and a thick suspension of Palestine mud was substituted. Red cross emblems were used in addition to the Geneva flag; large crosses were laid out on the ground and were reasonably conspicuous from the air. Later red crosses were painted on the roofs of some of the buildings just within the

perimeter of the hospital area, but these were not officially approved. In any case the quality of the locally bought paint was so poor that the once vivid red soon faded completely. Measures for passive air defence could only be partially adopted. Offices and stores were made splinter-proof, wards were revetted with mud bricks or sand bags, but shelters could not be provided. Consideration was given to making some of the administrative centres gas-proof, but no actual steps were taken. However, regular instruction was given in anti-gas drill and precautions, schools were arranged, and regular practices were held. Fortunately there was never need to put the efficacy of these measures to proof. It was estimated that ideally some protection should be provided for some 30 per cent of the patients.

DENTAL SERVICE

The dental units had a busy time from the first. After campaigning had started the question of the future of the dental services became more pressing, as it appeared to the A.D.M.S. (Dental) Colonel J. E. Down, that dental officers in part-time work were comparatively little use in their specialty, as they were used for many other duties. But in quieter times and in static camps or during periods of training dental officers were hard put to it to do all the work that lay before them. Lack of supplies hampered dental officers in the early months of 1940. Lieut-Colonel Finnie had arranged for some stores to be acquired for the 16th Brigade to leave with the first convoy, but there was no way of supplementing these except by local purchase in small quantities until adequate stores arrived with the corps headquarters. Dental material was available for purchase in Palestine; a factory near Tel Aviv made artificial teeth of good standard; some of this material had found an export market before the war. Finnie reported on arrival in Palestine that the complete dental unit with the 2/1st Field Ambulance had to deal with 2,000 troops, though the skeleton unit of the convalescent depot had to care for only 250. Convalescent depots are of course busy places for dentists, as opportunities are given there that do not readily occur in other units, provided the patients remain long enough. The same applies to some extent to hospitals, but here the dental units are busy in servicing neighbouring troops, as there are usually a considerable number in a hospital area. The men of the 2/1st and 2/3rd Battalions and other units camped at Julis in February 1940 were found to have had little treatment in Australia and none on the voyage. There was obvious need for more dental officers for this work.

The 3rd Special Dental Unit arrived in Palestine in May 1940 and reported that the dental condition of the 16th Brigade was "awful". Only some 20 per cent of the men were dentally fit, and the dental officers were concerned about catching up the leeway, for most of their time was already occupied with "sick" parades. The dental state of the 17th Brigade was found to be better than that of the 16th; this was no doubt due to the greater time available before embarkation. This unit eventually was transferred to Egypt, and after working for some time in Amiriya, in spite of

the difficulties with dust, later went on as far as Salum with the 2/7th Field Ambulance, being the most forward dental unit.

After a year of service it was reported in December 1940 that the dental conditions of the troops was still poor. The 2/5th Battalion for example had needed 1,200 fillings and 120 dentures, the 2/6th 800 fillings and 130 dentures, and yet with the staff and equipment available, dental services could not catch up with the work still to be done. At the end of 1940 the D.D.M.S. of the British forces in Palestine presented to the A.I.F. four out of six dental trailers captured from the Italians.

EQUIPMENT AND SUPPLIES

From the beginning of 1940 there were some troubles with equipment and supplies. Even before the first convoy of troops arrived Disher remarked on the shortage of drugs in the Middle East, and expressed the hope that all medical units would arrive fully equipped. Medical officers of transports were forced to purchase some drugs at Perth and Colombo, and in spite of criticism in Australia this action was necessary. The ships' hospitals sometimes had to be called upon, for example for anaesthetics for unexpected operations. Faulty handling of cargo on arrival in Egypt also caused temporary shortages: a number of cases of medical supplies for the 2/1st A.G.H. were missing, though most of these were recovered later. Misunderstandings arose at this stage between medical units with the 16th Brigade and the medical headquarters in Australia. Some of the equipment sent away such as instruments, plaster and gloves, was of unsatisfactory quality, and frank complaints were made. Actually, efforts were made to provide equipment of good standard grade, but the departure of the convoy in January was so hurried that in the end it was necessary to make good certain deficiencies with second grade material rather than leave serious gaps. The real mistake lay in not informing the medical officers who used the material. Unfortunately complaints and criticism leaked through the unofficial channels, as they always do, and there were well meaning attempts to supply privately alleged deficiencies from Australia. Still worse, inaccurate articles appeared in the Press.

The ordnance equipment was on the whole satisfactory. Difficulties with tents have been mentioned. Hospital beds were supplied of two types, the simple tubular frame on which was stretched an integral wide wire mesh with folding supports, and a more elaborate bed with a movable steel back rest. The first type sagged and stretched after a time and tended to rock. They were reasonably comfortable, but had no head rest: the Red Cross Society supplied an adjustable wooden attachment which enabled patients to be propped up. The special and expensive Zimmer bed was found to be very valuable in hospitals nursing members of the R.A.F. in England. Sir Thomas Dunhill strongly recommended it in his reports on surgical affairs in England, and later the Australian Red Cross Society supplied several of these beds for orthopaedic work in the 2/2nd A.G.H. By the end of 1940 strain was being felt in supplying both expendable and non-expendable medical equipment in the Middle East. Each addi-

tional medical officer appointed to new or expanded units needed equipment. The establishment of a base depot medical stores was expected to be of great assistance, but in the meantime the D.D.M.S., M.E. sent out an instruction to all hospitals to reduce reserves of medical stores from three months to one month. Lists of Australian deficiencies in the Middle East were sent to the D.G.M.S. Melbourne. It was thought in the Middle East that all R.M.Os. leaving Australia should be equipped as though serving with a newly-formed unit, thereby providing equipment for new units.

CONSULTANTS

As previously mentioned, consultants in medicine and surgery had been selected for the A.I.F. in the Middle East. Colonel N. Hamilton Fairley was appointed as Consulting Physician as from 22nd February 1940 and arrived in Palestine on 5th September 1940. For some time by mutual arrangement between the British and Australian Medical Services he also acted as Consultant in Tropical Diseases to the British forces in the Middle East. Colonel W. A. Hailes was appointed as Consulting Surgeon to the A.I.F. and also took up duty during 1940. Both of these consultants exercised a very stimulating influence on the medical services and did much to coordinate medical and surgical practice in the expeditionary force and bring it to a high state of efficiency.

Routine consultation services were established at the larger static medical units, chiefly the hospitals. The consultants were the heads of medical and surgical divisions, or the medical and surgical specialists. Some coherent organisation was essential; an uncontrolled service tended to encourage unit medical officers to pass on their responsibilities in decisions which would preferably be made by themselves. Therefore approval of the A.D.M.S. was required before a man was sent for consultation, and an appointment system was found desirable. Transport of men to and from hospital often presented some difficulty, and delays were often encountered in the receipt of the consultant's opinion by the medical officer. Though it was easy for a consultant organisation to be abused, it was a very valuable service, and saved many men from being needlessly admitted to hospital or submitted to a medical board. Considerable numbers of men attended these consultative clinics; ophthalmologists in particular were kept very busy, and the extra work entailed for all officers acting as consultants often imposed a definite burden in areas where large bodies of troops were camped in the vicinity. During 1940 it was observed at the 2/1st A.G.H. that when the volume of consultations grew too great to be handled easily on one day of the week and two days were allotted, the number of men seeking consultation was immediately doubled. A review showed that nearly 80 per cent of the consultations were really unnecessary. Radiological, pathological and biochemical examinations were not carried out on request of medical officers except after approval of a senior physician or surgeon.

PHYSICAL STANDARDS

When training began in Palestine the general condition of the troops was good. There was a noticeable improvement of the physique of the young and immature, but the over-age group showed signs of not standing up to the work. Complaints were made that some obviously unfit men had been enlisted. It has been pointed out in Chapter 2 that these complaints reached Australia, where Lieut-Colonel H. H. Turnbull had been appointed to report on and supervise the standard of medical examination. It appeared from this report that not more than half the unfit men accepted had been passed through careless or inadequate examination. Even a period of training in Australia did not ensure that all the unfit would be eliminated. Both original and reinforcement drafts sometimes included men who had defects of locomotion; some of these men had never done any marching. The answers supplied by men seeking to enlist were frequently misleading and inaccurate; even greater care in securing answers to the *questionnaires* presented to each recruit did not ensure accurate replies. After a few months in Palestine numbers of men were submitted to medical board for reconsideration of their classification; and those found unfit for further service increased in number. As the 2/1st Hospital Ship *Manunda* did not arrive till November 1940 many of these men were held pending return to Australia. A few of these had been allowed to leave Australia in error as X-ray examination before embarkation had shown evidence of tuberculous lesions of the lungs.

An analysis of the first group of men returned to Australia from the Middle East was carried out by army medical officers on the *Manunda*. This differentiated the men with disabilities existing before enlistment from those whose disabilities originated on active service. The analysis showed that few cardio-vascular diseases occurred in this series, no doubt owing to the favourable age group and to care in examination. A feature of the small number of diabetics observed (5 out of 208) was their severity; this too may have been related to the predominant age group. Peptic ulcer was an important cause of disability; forty-two cases occurred in the series, 80 per cent being duodenal. Study of these men showed that a history suggesting dyspepsia of the ulcer type should exclude a recruit from acceptance for active service, and that any dyspeptic history other than of a temporary kind should be regarded as an indication for further investigation before enlistment.

Lastly, forty-five patients had orthopaedic conditions of some kind. There were few disabilities of the feet, owing no doubt to the satisfactory pattern of service footwear, and the higher standard of prophylactic and therapeutic orthopaedic care in the army of the day. It will be noted that the ability to march is not an outworn function in armies, though the use of motor transport has been an important factor in saving considerable physical strain. Lesions of the knee joint accounted for twelve patients, part of a large group with injuries, usually treated with success. The greater number of orthopaedic conditions were associated with backache.

In fact backache and indigestion were two of the commonest complaints of soldiers parading sick. Twenty-five men had low back pain, concerning which a special instruction was promulgated later. The similarity of the symptoms and signs in patients of this class suggested that the common causes were age and vulnerability to strain, though it must be admitted that lesser grades of such a disability do not render a man unfit for all types of service. One of the most interesting features of this survey was that it revealed that 74 per cent of the invalids gave a long history of pre-existing disease aggravated by service. It is significant that in the first year of war the wastage of men through disabilities not due to wounds or to serious acute disease was very considerable: some of this wastage was inevitable, but some was preventable. Impersonation could account for a certain number of men who appear in an armed force overseas, but incomplete examination must have accounted for others.

MEDICAL BOARDS

It soon became necessary to institute medical boards for reclassification of members of the A.I.F. overseas. When the 16th Brigade left Australia exact procedures had not been as yet settled, and in the absence of a standard AAF D2 the British Army form B179 was used in Palestine. Two boards were constituted and sat at the 2/1st A.G.H. Inevitable delays occurred at first through the lack of local facilities for investigation, as this had to be carried out at the 12th British General Hospital at Sarafand nearly forty miles away. Once the Australian ancillary services were established the work was done more expeditiously. The first boards appointed included Lieut-Colonel A. S. Walker, and Majors T. Y. Nelson, G. B. G. Maitland and R. V. Graham. The documents were submitted through the D.D.M.S. of the British Force in Palestine, Colonel Large, and lack of familiarity with the British forms caused difficulty at first. Later a revised version of the Australian D2 forms was approved by the D.G.M.S. in Australia, and these were available for use. These employed the classification which conformed to British practice and which with modifications was used throughout the war. In this system those fit for active service with field formations were classed "A", those fit for active service other than with field formations, "B"; those temporarily unfit, "C"; or if temporarily unfit for a period likely to exceed six months, "C2"; and those unfit for military service, "D". This terminology eventually replaced the original classification for recruits, class I and class II A and B. During the war period constant changes were made in the method and definition of classification. The important subject of medical classification will be further discussed in the light of later experience. At first some men were submitted to medical boards by unit medical officers, but this practice was soon stopped and the regular routine was adopted whereby the medical officer filled in the first two parts of the D2, approval was given by A.D.M.S. or other delegated authority, and final confirmation was given by D.D.M.S. or deputy.

The first standing medical board was constituted on 15th December 1940 by the seconding of Major W. E. A. Hughes-Jones of the 2/2nd A.G.H. and Major J. H. Halliday of the 2/5th A.G.H. to this work. These officers could not cope with all boards, especially as the total of troops in Palestine was 27,000 at the time of their appointment, but they did excellent work and set a high standard of thoroughness of examination and accuracy of record. Most of the medical officers attached to hospitals were employed in the work of boards at one time or another. The advent of a unit such as the 2/2nd A.G.H. helped greatly in this as in a number of other forms of medical activity, and without the tie of simultaneous clinical ward work, did much to bring this work to a high level of efficiency. Later it was found necessary as well as helpful to have boards carried out in hospitals by the medical staff.

Brigadier Burston directed that men not likely to be restored to the "A" class standard within six months were to be returned to Australia. It was important to have decisions about a man's medical future made early where this was possible, and medical officers in hospitals were often in a position to reduce the strain on beds by early classification of patients with long-term disabilities. Finally Lieut-Colonels J. Gray and C. K. Parkinson were appointed as a permanent standing medical board and proceeded to the Middle East where they coordinated this work and were ultimately instrumental in having a number of reforms and amendments made in procedure. These officers carried out a considerable amount of instructional work in addition to those labours which can be appreciated only by those who have had personal experience. The confirmation of medical boards alone is a colossal labour when the numbers are large, yet the faithful and accurate performance of this dull work is vitally important to the army.

HYGIENE

Within a few days of disembarkation unremitting surveillance of the camp areas was begun by the 2/1st Field Hygiene Section and later continued by the others. Steady policing is always necessary to keep awake the hygienic conscience of men when assembled together. Courses were begun in the various branches of hygiene, in particular water duties. As the cold weather passed fly breeding began to increase and was particularly troublesome where native quarters or settlements were adjacent. The great activity in preparing camp sites and erecting buildings made close contact with large numbers of Arab labourers inescapable and their insanitary habits were hard to control. In the main for sanitation in the camps a conservancy system was used. Otway pits were prepared or in course of preparation when the first convoy arrived, intended for use in conjunction with a conservancy system. When well constructed these were on the whole very satisfactory, though they were at times somewhat of a nuisance, especially in the summer, and were affected in efficiency by the entry of heavy rain, which occasionally would cause collapse of the walls. Conservancy areas needed close supervision of the contractors, whose ideas

of the details of the disposal of refuse or excreta were sometimes easy-going. They were not always deterred by the fines laid down in contracts. Deep trench latrines were used with success in some areas. The disposal of sullage water was troublesome, for the tenacious soil did not readily absorb water and this defect in soakage made sullage pits overflow readily unless they penetrated to the sand levels below the surface layers of the soil. These levels were often deep, and it was necessary to sink the pits to a depth of from 30 to 100 feet and line them with fenestrated concrete blocks. These so-called "Tel Aviv pits" were fairly satisfactory, though it was found that periodical visits from a mobile pumping plant were needed. This rather odorous procedure ensured reasonable surface drainage.

It was constantly necessary to police all camp areas whether occupied or not, for it does not follow that an area in good order will remain so if unsupervised. For instance Gaza Airport camp which had been an occupied and well controlled area, was reoccupied by some 1,000 troops, when numbers of deficiencies and faults in hygiene were soon discovered. The cleanliness of canteens was not above reproach at times. The employment of Arabs in the kitchens involved a certain health hazard, and their methods were often open to criticism and needed constant supervision. In November 1940 the C.O. of the 2/3rd Field Hygiene Section reported that in the Gaza and Qastina areas the washing of glasses and crockery were unhygienic, an unsatisfactory three bucket system being used. Food was not always protected from flies and fruit was not always washed as directed. The milk in Palestine was not only limited in supply, but it was not always bacteriologically pure. It was not easy to secure a good and adequate supply of fresh milk for hospital patients. A little later this risk was emphasised when cases of enteric fever occurred, and advice was given by the medical services that pasteurised milk should not be allowed in A.I.F. canteens, and that all milk should be boiled.

PREVALENT DISEASES

On the whole the sick wastage of the A.I.F. during 1940 in the Middle East was not unduly high. With an average strength of 14,258 during this period the rate per 1,000 yearly strength was 988 hospitals admissions, of which 920 were due to illness. The remainder were chiefly due to injuries as there were only 27 battle casualties recorded. The total represents a daily sick rate of about 3 per 1,000 or 0.3 per cent per day, which is about the expected rate in the circumstances. Most of the sick wastage was accounted for by mild types of seasonal, epidemic or constitutional disease. Rates per 1,000 are shown in the accompanying table.

In the infectious group the figures for dysentery are certainly underestimated. So much dysenteric infection of a mild order occurs in the Middle East that even non-immune persons may during a mild attack of diarrhoea act as carriers of a potentially toxic dysentery. The importance of these sources of infection was proved many times in the succeeding

years, particularly of those associated with the handling of food. About half the respiratory disease was due to pneumonia, strictly speaking infectious, but this was usually of benign type. Possibly some cases of the so-called "atypical" pneumonia occurred, but in the majority a good response to sulphapyridine was noted. The economy demanded in the use of drugs encouraged a modest dosage of sulphonamide which seemed to be sufficient. In one series of lobar pneumonia a total dosage of some 20 to 25 grammes was effective. Measles and mumps came with the troops. Mumps in particular was important, for as usual, it was a significant cause of invalidity. Its fairly long incubation period and its disabling metastatic complications are always troublesome in the adult male. Fortunately there were few worrying cases, and only a small proportion of instances of involvement of the central nervous system were seen. In a few men evidence of mild meningo-encephalitis were observed, which soon subsided without sequel. At a later stage more infections of the nervous system were seen either in relation to declared epidemic infectious disease or independently. This will be referred to later, but it may be remarked that from the beginning cases of peripheral neuritis were seen in Palestine. Some of these caused familiar syndromes such as facial, radial or peroneal paralysis. In some instances investigation showed the dissociation of cellular and protein content of the cerebro-spinal fluid familiar in the Guillain-Barré syndrome. These affections which presumably are due to a virus infection are of course observed sporadically in all communities, but it is important to point out that a noticeable number of them were observed in the Middle East in 1940, because in the earlier stages of the Pacific war cases were seen both in Australia and the Islands and false deductions were drawn. It was assumed by some that these conditions were appearing for the first time: it was even suggested that there might be a relationship with malaria.

Infectious			Not classed as Infectious		
Sandfly fever	.	80.30	Digestive System	.	196.87
"Influenza"	.	52.74	Skin	.	110.25
Venereal Disease	.	35.21	Respiratory	.	95.17
Mumps	.	28.96	Nervous System	.	74.84
Measles	.	27.00	Genito-urinary	.	38.29
Dysentery	.	20.90	Locomotion	.	33.59
Malaria	.	9.19	Rheumatic	.	27.12
Diphtheria	.	8.56	Circulatory	.	23.78
Enteric Fevers	.	0.49			

Malaria in Palestine and Egypt during 1940 was not of epidemiological importance. During the year only 131 cases were reported. However, as might be expected, its significance was not always realised at first in non-medical circles. Southern Palestine was so well controlled in most areas when the A.I.F. entered it that the possibilities of malaria following night

exercises were rather waved away at first. Little pockets of infection were evident, however, during the summer months, proving that in areas of potential risk precautions are not only necessary in order to reduce sick wastage, but to initiate that anti-malarial conscience which is an essential part of the equipment for a campaign in areas where malaria is even slightly endemic.

Limited outbreaks of diphtheria occurred in 1940, but it was not thought that there was need for wholesale immunisation, though it was recognised that the highly toxic and even lethal type of infection might occur in a military force. Only fifteen cases of cerebro-spinal meningitis occurred during the year, with one death. Even allowing for the vast improvement in treatment with sulphonamides, it was felt that so low an incidence was fortunate.

Of the infectious diseases two groups remain for special comment. Sandfly fever made its appearance in the early summer and struck hard. Clinical accounts have been given in Volume I of this and the other related short-term fevers: at present we are concerned with the effect on a force of an epidemic infection borne by an insect vector. The official records of the incidence of sandfly fever in 1940 far under-estimate its true extent. Not only was the 2/1st A.G.H. almost filled with patients, but all the field medical units and camp reception stations were also overflowing. Medical officers of combatant units held a few patients in their tents, and others with mild infections managed to carry on without succumbing. Probably the amount of camp construction which had gone on up till early summer accounted for a certain proportion of the epidemic, for the sandflies were thereby presented with many breeding grounds. It was noticed that sandfly fever would appear in non-medical wards after patients had been admitted to hospital, and once the purely local sandflies had become infected men admitted to these wards with other complaints would continue to acquire sandfly fever. One thousand one hundred and forty-five cases were officially recorded during the summer months: without doubt there were very many more. Had it only been practicable to point the moral of this epidemic perhaps the possibilities inherent in disease carried by the bites of insects might have impressed an army destined to face the problem of malaria. But at that stage the increase of case incidence of an infectious disease by geometrical progression was regarded as only a nuisance and the lesson was still to be learnt. Cases of infective hepatitis occurred during the year, but only in moderate numbers. During the epidemic of sandfly fever confusion was not uncommon during the early stages. Some fairly severe cases were encountered, but most of the infections were mild.

The other group of diseases calling for special comment includes the venereal infections. The numbers did not appear high at first, but as the number of troops increased and local security could be relaxed and leave made a more liberal privilege, the position became less satisfactory. Each campaign had its individual experience in this regard. Later it will be shown how the period following the Syrian campaign gave rise to con-

siderable anxiety. A general discussion is premature at this stage, but it may be pointed out that the official figures for venereal diseases even in 1940 exceeded those for dysentery, which was recognised to be the principal endemic disease risk in Palestine. At first treated in an annexe of the 2/1st A.G.H., patients with venereal disease were later transferred to the 8th Special Hospital, where diagnostic and therapeutic work of a high standard was carried out. Reference may also be made to the so-called "non-specific urethritis". When contracted in the usual way this is, strictly speaking, one of the venereal diseases and should be so regarded.

During 1940, the staff of the 2/1st A.G.H. early noticed that non-bacterial pyuria was by no means uncommon. Some of the cases of mild urinary tract infection were thought perhaps to be related to the prevalence of oxaluria, and the relatively high incidence of calculus in the Middle East was also recalled. But the occurrence of some instances of the so-called Reiter's syndrome, in which the association of urethritis, arthritis and conjunctivitis suggested other possibilities than local infection. Involvement of the eye or of joints was occasionally observed in bacillary dysentery, but the fully developed syndrome was seen without concomitant diarrhoea. It was possible therefore that abacterial pyuria might be the primary lesion, and might arise from both venereal and non-venereal sources.

Two other forms of disability were of outstanding importance in the Middle East, those due to digestive disease, and those affecting the skin. Digestive disorders afforded a good example of psychosomatic disease, ranging from the functional dyspepsias to proven peptic ulcers. Diseases of the skin were expected to cause considerable sick-wastage. Indeed the medical staffs of the A.I.F. hospitals had voiced this opinion even before embarkation. Perhaps there was still some traditional mistrust of "specialists" in service circles, as there was a feeling that their enthusiasm might not always be directed along military channels. But the need became more apparent, and dermatologists were found of great value in hospitals, even though they were not at first officially recognised as such on the establishments.

The most common skin lesions in the Middle East were the sensitisation or allergic type, the fungus infections and their imitators, and "septic sores" known by many other soubriquets. Precautions were taken to limit the spread of tinea of the feet in ablutions and living huts. Under static conditions this is not very difficult, provided regular and adequate inspection of the men's feet is made, and all those objects with which they make contact, including such diverse things as socks and "duck boards". On one occasion inspection revealed twenty cases of tinea in a brigade headquarters in which no foot inspection had been carried out for twelve months. Active campaigning among medical officers was necessary to prevent over-activity in treatment.

Septic sores caused considerable disability at times, particularly if chronicity was established. As the condition is discussed in Volume I it is only necessary here to state that streptococcal and staphylococcal infec-

tions were found to be common, that these skin ulcers most commonly affected areas likely to be traumatised, and that they appeared more often under conditions when water supplies did not permit regular washing of the skin. They were relatively uncommon among officers. No direct connection was established between these lesions and deficiency of vitamin C.

Scabies occurred to some extent during the colder months. Disinfestation was carried out at convenient centres, and sulphur ointment was most commonly used for treatment. Benzyl benzoate was not obtainable. Some trial was made of nascent sulphur obtained from a thiosulphate solution, but this was found less effective and inconveniently cold during the season of greatest prevalence. Chemical dermatitis occurred at times from excessive and prolonged use of ointment, and it was found that constant supervision in this as in all details of dermatological work was necessary.

Accidents. The frequency of accidents must be mentioned, since they were a cause of wastage. Orthopaedic surgeons were called upon to treat many fractures of the scaphoid bone of the wrist, owing as a rule to indirect violence, and internal derangements of the knee joint, and other traumatic lesions of the lower limbs. Some accidents were due to the playing of games, but far more to the hazards of tent ropes and slit trenches encountered during a black-out. The prognosis of removal of a meniscus was of particular interest in relation to fitness for service. The after-treatment of these patients, and those treated for fractures of bones of the limbs increased the demands on physiotherapy, and the important changes which took place in later years in organisation and equipment of these services were in part energised by the experiences of the Middle East.

Road accidents began to be disturbingly frequent as transport and travelling increased, and during 1941 caused an appreciable wastage of men. Though an important cause was possibly the unfamiliar rules of the road, there also appeared to be a regrettable tolerance to the risks of road travel, as civilian experience still emphasises.

Psychiatry. Early in 1940 men were seen with psychiatric disabilities. Some of these were sent back to Australia in the *Manunda* at the end of the year; a minority who had mild anxiety states, were able to continue work, sometimes after transfer to a lower category of fitness. A few men were seen with obvious mental deficiencies, such as should have been apparent on routine examination. The number of true psychotics was small, but among these were several who had a history of previous episodes, certainly schizophrenic in type. In the first few months a tented ward in the 2/1st A.G.H. was the only accommodation available. Even with an annexe for a noisy patient a tent presents difficulty in handling of psychotics, and on several occasions when all hypnotic drugs were scarce and the most suitable barbiturates were unobtainable mechanical restraint was necessary. Even with the assistance of orderlies skilled in

mental nursing the situation was trying. Later huts were available, and after the arrival of the 2/2nd A.G.H. arrangements were made to hand over to medical officers of this unit the psychiatric and infectious blocks. With improved facilities for treatment and more amenities numbers of these patients did well, though the long delay in securing sea transport back to Australia was unhelpful for those with depressive states. No psychiatrist was officially appointed or recognised in the A.I.F. at this stage but the advice of Colonel J. K. Adey, when commanding the 2/1st C.C.S. and later the 2/1st A.G.H. was available and most valuable. At one stage when attached to the A.I.F. headquarters Colonel Adey acted as adviser to the D.M.S. on psychiatry.

The question of neuroses was discussed by a committee of physicians appointed by Brigadier Burston during 1940, and methods of classification and handling were recommended. The recognition of the acute combat neuroses as exhaustion states was important at this stage; it helped to establish correct lines of treatment and to remove the mistaken ideas of the 1914-1918 period.

SURGICAL SPECIALTIES

As some references have been made to the recognition of certain specialties in the Australian medical services in the Middle East it may be pointed out that an organisation was set up to provide centres for the most important surgical specialties in the A.I.F. On 15th August 1941 an administrative instruction was issued by the D.M.S. from the medical headquarters in the Middle East on the subject of special surgical centres. These consisted of:

1. Orthopaedic (or physiotherapy) centre at the 2/2nd Australian General Hospital in charge of Major J. B. Colquhoun.
2. Facio-maxillary and plastic centre at the 2/2nd A.G.H. in charge of Major B. K. Rank.
3. Thoracic unit at the 2/1st A.G.H. in charge of Major E. S. J. King.
4. Neurosurgical centre at the 2/2nd A.G.H. in charge of Lieut-Colonel L. C. E. Lindon.

Conditions were laid down controlling the types of disability dealt with at these centres and the physical state of patients to be transferred. Experience showed that only a certain proportion of patients with these disabilities could be easily transported, and changes in the disposition of the A.I.F. during 1941 altered local conditions. For these reasons a considerable amount of special surgical work was carried out at well equipped hospitals apart from the special centres. The objects of these centres were twofold, firstly to concentrate as much special work in centres as possible so that skilled surgical and nursing teams should be built up, and secondly so that their influence could be diffused through the medical units of the force. Thus the aim of surgeons was more and more directed towards the need to look to the physiological and anatomical end in view. Though

circumstances did not allow some of these special branches of surgery to flourish as much as they might in delimited centres, recognition of their particular value was most helpful as the war went on.

OTHER CONDITIONS

There were several other matters of general medical interest, notably certain questions were raised which closely concerned operational conditions. One was the occurrence of heat disturbances in troops undergoing training during the summer months. A technical instruction was circulated as soon as the heat of summer began and cooperation of all ranks was invited in the prevention of heat collapse, hyperpyrexia and the various manifestations of this special and important type of environmental disturbance. Later an expanded account was promulgated in a technical instruction, which emphasised the necessity of maintaining a reasonable water balance. Actually not much trouble was experienced at this stage; and though Palestine and Egypt can produce fierce and sustained heat, neither its intensity nor the conditions under which the men worked in 1940 were comparable with those met with in Mesopotamia in the previous war. During battalion training exercises occasional instances of heat exhaustion and salt depletion were noted by field ambulances. These occurred on very hot days with a hot wind. A suggestion was made at one time that the water ration of troops training in hot weather should be deliberately restricted in order to accustom them to deprivation of a generous supply, but the opinion of medical services was that, while it was part of a soldier's training to discourage him from drinking copious water especially if unsalted, it was not wise suddenly to limit his ration during an unaccustomed exercise. The reduction of water ration through local stringency, as happened later in the Western Desert, accomplished this acclimatisation successfully in most cases. In hospital it was found advisable in dysentery wards in very hot weather to delegate an orderly to the duty of preparing sufficient glucose drinks and seeing that the patients took them.

The question of glare was also introduced, and a medical decision was asked on the advisability or otherwise of troops wearing dark glasses. The answer was decidedly "No", not only because this would be impossible for fighting troops, but also because it was possible and desirable to become accustomed to glare. Only in certain instances would headache be likely to occur, and then the likely cause was astigmatism. Drivers of motor transport and anti-aircraft gunners like aircraft pilots and "spotters" often needed dark glasses. Another question was whether it was advisable for transport drivers to be allowed to take "Benzedrine" to counteract fatigue on long journeys. The answer given in this instance was also "No", because special circumstances such as those of pilots of aircraft on sustained missions had not arisen. It was felt that under the prevailing conditions the relief of drivers on long journeys would be a better method of combating fatigue.

CONVALESCENCE

As previously mentioned the 2/1st Australian Convalescent Depot was not established till towards the close of 1940. In November 1940 the maximum number accommodated was 16 officers and 550 O.Rs. This unit was organised on a part-military part-medical basis so far as its activities were concerned, had the usual amenities, and began to organise occupational therapy. This relieved the hospitals in Palestine greatly, and besides the recuperative work of a convalescent depot useful dental work was carried out, and, at intervals, medical boards were convened there.

In addition to the facilities for officers at Kafr Vitkin arrangements were made for a limited number of convalescent officers on the Nile steamer *Victoria*, moored near the Ghezireh Club, Cairo. This "House-boat" under command of Major S. Crawcour was a popular resort for convalescent officers and served a useful purpose. Arrangements were also made for convalescent officers in the 4th New Zealand Hospital to be sent to the New Zealand Convalescent Depot at Moascar.

CONDITIONS ON TRANSPORTS

With the arrival of the second convoy in May 1940 the question of the health of the troops on board sea transports was examined. Reports had been made in February, and some anomalies of supplies and of matters of administration had been rectified. Later in the year, as other ships arrived from Australia, experience accumulated. Most of the Australian troops were transported on ships of large size and excellent appointments, but nevertheless not always well adapted to troop carrying for a relatively long voyage. Quarters for officers were often quite luxurious, but the men were perforce accommodated on lower decks where the ventilation was often defective and heat excessive. Cabins normally designed for two persons often carried four to six, and similar conditions prevailed in the other types of accommodation. Hospital accommodation on the transports was inadequate. In the *Mauretania* for example, the senior medical officer objected that the ship's hospital could accommodate only twenty-one, less than 1 per cent of the troops. About ten days after sailing there were 150 cases of mumps and measles on board. These discomforts were accentuated by passage through the tropics and still further by black-out conditions at night. Some of the larger ships, such as the *Queen Mary* and the *Queen Elizabeth* were magnificently appointed in their usual condition, but were primarily designed for Atlantic crossings. Water supplies were often restricted on these ships, since the number of troops carried far exceeded the passengers normally accommodated. In these circumstances infections transmitted by the respiratory tract tended to multiply. Anxiety was felt for a time about cerebro-spinal meningitis when this disease broke out in the camps in Australia, but careful examination, and if necessary segregation of possible sufferers prevented trouble. Epidemics like measles, rubella and particularly mumps were troublesome, not only during the voyage, but by reason of their spread

through the camps in Palestine. A minor trouble on the transports arose with the men's feet. Military boots were not ideal footwear for shipboard, and sandshoes which were the alternative tended to produce some strain in feet unaccustomed to unsupported exercise.

HEALTH AND AMENITIES

The general health of men in camps was good on the whole, though the sickness rate was not inconsiderable. In July 1940 the D.D.M.S. of I Australian Corps reported to the corps commander that daily average admissions to hospital for the previous month was 2.2 per 100. The daily average of troops sick in hospital was 4 per cent of the force.

The conditions of the troops were good in the camps. Care was taken to avoid overcrowding either in an area or in individual accommodation units. Most of the men slept in good weather-proof tents, and adequate hut accommodation was provided for meals, amenities and sanitation. Diversionary activities were encouraged, and full facilities given for sport, for which units were encouraged to arrange an organisation chiefly in the hands of the men themselves. Swimming was popular, and was practicable in some of the areas near the sea, the chief difficulty being transport. Special transport was provided by the Australian Red Cross Society for nurses and convalescent patients. The beaches were good, but the surf was often dangerous on account of channels and strong currents. A few deaths occurred from drowning. All possible care was taken of men indulging in swimming and in one or two larger areas such as Gaza a life-saving organisation was built up, equipment from Sydney beaches being used through the generous assistance of surf clubs. A most successful surf carnival was held at Gaza during the summer.

Good postal facilities were provided, and after a time concession rates for air mail were granted. The excellent effect of letters upon the spirit of troops was well illustrated among patients in hospital. Chaplains and Red Cross workers gave most valuable assistance in helping sick men with correspondence, and in seeing that their relatives at home had word from them, a very valuable service whose importance can easily be overlooked.

Cinemas were built in the chief camp centres which accommodated large numbers of men. In these pictures were regularly shown, and when possible visiting concert parties gave entertainments of that kind usually thought suitable for and appreciated by troops. Performances by the Palestine Symphony Orchestra were also arranged, and large audiences attended performances by this organisation of world standard.

RATIONS

The rations supplied to the A.I.F. in the Middle East were based on a generous scale which gave 4,100 Calories. The basis of shipments to the Middle East is shown in the appendix.

This scale was altered by equivalents and variants to suit different circumstances under which issues were made. The British ration in the

Middle East gave 3,950 Calories: it contained less fresh vegetables, butter, cheese, sugar, jam and milk, which were replaced by fresh fruit, margarine and bacon. The butter was not always palatable when it arrived in Palestine or Egypt. "Marmite" and ascorbic acid were contained in the British ration. The difference was only slight, and when the Commander-in-Chief in the Middle East suggested that in order to simplify rationing the British scale should be regarded as satisfactory for Australian troops ready assent was given by the medical services. The Red Cross Society was very helpful in supplying various items for the sick which could not be readily obtained otherwise. For example, in the early summer of 1940 the 2/1st A.G.H. was very short of glucose, used in quantity for patients on fluid diet. The preparation supplied was also expensive and contained vitamin D, which was not necessary, but Colonel H. Cohen, the Red Cross representative in the Middle East, soon produced a drum of commercial glucose by local purchase.

Canteens were set up in Palestine and Egypt at which extra items of food, toilet articles and the like could be bought, including beer. At first the facilities of the British "N.A.A.F.I." were available to Australian troops, but soon the Australian Comforts Fund financed Australian canteens. Beer as an amenity was no doubt of value to men far from the comforts of home in a hot climate, but the controversial question of alcohol for troops was not solved so easily. Without strict policing even army canteens could be trouble centres, and drunkenness was seen in towns among troops on leave, for which the poisonous potency of some of the forms of alcohol obtainable even in the vicinity of some camps was largely responsible. Colonel Johnston, D.D.M.S. I Australian Corps in correspondence with General Downes, Inspector-General of Medical Services, pointed this out, and said that the idealisation of beer among Australians as a nation as well as a fighting force was responsible for a bad outlook on the problem. A few unpleasant episodes occurred at times with inebriated patients or convalescents, who had escaped from hospital precincts, and with offensive behaviour of battalion guards due to drink. The importance of alcohol in relation to venereal disease, well known in civil practice, has been mentioned elsewhere.

CLOTHING

Clothing needs only slight mention during the early training period. Troops were issued with a cloth service uniform and two working dress uniforms while in Australia; in Palestine shirts and shorts suitable for tropical wear were issued, though it might have been preferable if these had been available before embarkation. After some months of wear most of the drill working uniforms were unserviceable and some men had no suitable trousers for wearing after dark. Fortunately malaria was well controlled in most areas of Palestine. Stationary medical units sometimes found that patients arrived with little useful clothing in their possession, causing a strain on the units' stores. Incidentally the not uncommon losses of personnel equipment of men sent to hospital caused trouble in the

matter of cutlery, which would mysteriously disappear from hospital wards. In spite of regular checks only twenty sets of cutlery could sometimes be mustered to feed seventy patients. Footwear did not give much trouble, provided a correct selection of boots was made for each man. In general the army boot proved very satisfactory, and an improved boot with a block toe introduced during the Middle East period was even better. Major E. F. West introduced a measuring board which became a standard ordnance issue. Orthopaedic surgeons helped greatly by carrying out careful surveys of footwear, and instituting courses in chiropody. Chiropody schools were organised towards the end of 1940; these were based on a scheme drawn up by Major R. V. Graham, and provided a twelve days' course for ten men. No claim was made that the men so trained became skilled chiropodists, but they were able to work in field units, carrying out simple procedures and implementing some of the important principles. The nurses who embarked early in 1940 were equipped with very poor shoes, though these were supposed to conform to an approved standard. Only ten out of fifty-four were passed by an orthopaedist as fitting correctly. Fortunately more satisfactory shoes could be obtained locally at a lower cost.

THE SITUATION AT THE END OF 1940

The medical headquarters of the A.I.F. was organised in general correspondence with the army headquarters system. The A.D.M.S. and D.A.D.M.S. corresponded with A.M.D. 1 and 2, dealing with personnel and supplies, and hospital care and accommodation. The Matron-in-Chief and the A.D.M.S. Dental were attached to the staff of the D.M.S., Brigadier Burston, under whom the base area and lines of communication area were also administered. Hygiene remained as a direct responsibility of the corps.

Part of the 7th Australian Division had reached Palestine at the end of 1940, and with this formation were the 2/5th Australian General Hospital and the 2/2nd C.C.S. On the 26th December 1940 the 2/5th A.G.H. was established at Kafr Balu near Rehovot in Palestine for purposes of administration, but was not able to start work as the buildings and other facilities were not ready. The 2/2nd C.C.S. moved from Dimra in Palestine to Amiriya in December and was ready to move forward from there.

The 2/2nd A.G.H., after disappointments and delays due to difficulties of siting and construction, began to take patients on 29th December 1940, at Kantara. The 2/1st A.G.H. at Gaza was then accommodating 700 patients. A suggestion was made at this time that the area comprising Kantara East and West should become an Australian hospital centre, but changes in the military position ordered events otherwise.

In the late summer of 1940 the 6th Division moved to Egypt. Arrangements were made for Australian troops to be admitted if necessary to the 10th British General Hospital or the 4th New Zealand General Hospital. Attempts were made to supply deficiencies in equipment, both general and medical, but there were still some shortages of transport and of certain

ordnance supplies. The immediate role of the 6th Division was to be the defence of Alexandria and the north-west part of the delta in case of a break through by the large Italian army on the border of Egypt. Before the end of September a pact had been concluded between the "Axis" powers, Germany, Italy and Japan. It was evident that the position in the Middle East was unstable, and that changes must be imminent.

The senior officers of field ambulances toured the Western Desert as far as possible, and saw the conditions under which the medical elements of the Western Desert Force were working. Points from their reports are interesting as a foreshadowing of the events lying before them. They found a British field ambulance acting more or less as a C.C.S., other field ambulances disposed with a view to maximum mobility, with sections budded off so as to give both movement and efficiency, and witnessed the struggles of motor transport in sand navigating what seemed trackless wastes. There they felt the bitter cold of the desert nights, calling for extra blankets and bivouac sheets, saw dressing stations effectively blacked-out, and experienced every-day living with minimum of water, with extemporised sanitation, and in a state of general discomfort.

The Australian division was first to camp at Amiriya, a stony undulating desert swept with dust by every wind. Acutely ill patients were to be sent to the 5th British Hospital at Alexandria. The question of medical arrangements were discussed with General Blamey, in view of the difficulty in realising the Australian ideal of treating Australian servicemen in their own hospitals. He pointed out that in present circumstances this was impracticable, as under action conditions it would involve large hospitals being unoccupied for long periods, owing to the long distances and necessary dispersion of men and material. He felt that at the time it was not advisable to place a C.C.S. in the delta area. Certain minor difficulties arose over conducting patients from the 4th New Zealand General Hospital to the convalescent depot at Moascar, but these were overcome by placing a non-commissioned officer in charge of the parties. There was a suggestion made of siting an Australian convalescent depot along Lake Maryut at Ikingi Maryut, or Burg el Arab, but no move was made at this stage. A "Box" exercise was carried out on 16th to 18th October as a trial of desert manoeuvres. It is of a certain interest that the ambulance commanders thought that they should be attached to brigade headquarters as liaison officers so as to be able to act personally as soon as any change of plan was made. Essential men were instructed in map reading and desert navigation, and by November training was well advanced. At the beginning of December three field ambulances were in the area around Amiriya and Burg el Arab, waiting for movement orders.

On Christmas Day all medical arrangements were concluded for the forthcoming battle, which was expected within a week. So closed 1940, with some units of Australian medical services establishing and equipping in Australia, others in England, some working and training in Palestine, and others in Egypt and Libya, where their proving was to be in the cold gritty discomfort of blowing sand.

APPENDIX

Ration Scale

Commodity	Scale in Ounces
Bread	16
or biscuit once weekly	12
Frozen meat	16
or preserved meat once weekly	10½
Fresh vegetables	16
or peas or beans or lentils once weekly	4
Potatoes	12
Onions	3
Bacon	2
Cheese	1 1/7
Butter	2
Tea	¾
Sugar	4
Milk	2½
Jam or marmalade or golden syrup	2
Salt	½
Meat loaf once weekly	4
Salmon twice weekly	3
Herrings twice weekly	3
Pepper	1/100
Mustard	1/100
or curry powder once weekly	1/6
Flour or rice or oatmeal	2
Dried fruits	1

In addition 1½d per man per day may be expended by units to provide extra perishable items of foodstuffs. On medical advice a weekly issue of 16 ounces of fresh oranges or 12 ounces of fruit juices containing anti-scorbutic elements may be made.

CHAPTER 6

THE A.I.F. IN THE UNITED KINGDOM

MILITARY LIAISON WITH THE UNITED KINGDOM

THERE has of course always been a close linkage between the medical services of the navy, army and air force of Britain and the Dominions. A close correspondence between the organisation of the medical services of the Royal Navy and the Royal Australian Navy has been maintained so far as varying conditions allowed. In the case of the army, War Office practice has been adopted in a general way, though there have been and still are many differences between establishments and equipment tables. The R.A.A.F. medical service in its more adolescent days showed foresight in arranging an exchange of medical officers with R.A.F. and in keeping in touch with the technical problems peculiar to an air force.

General Downes, when D.G.M.S., was sent overseas in 1939 to gather information first-hand on problems concerning equipment, mobilisation and technical advances; it was unfortunate that this trip had not been arranged earlier, when its value would have been so much greater. When he returned to Australia war had already broken out and certain arrangements were made which had been tentatively explored while he was in England. These included the appointment of Sir Thomas Dunhill as Consulting Surgeon and Dr N. H. Fairley as Consulting Physician, and Dr (Major) H. M. Trethowan as Medical Liaison Officer. The value of these appointments was at once apparent. Sir Thomas Dunhill collected and sent to Australia a steady stream of literature and personal accounts of recent advances and latest methods in war surgery. Extracts of some of these letters were circulated among medical service officers in Australia. He also became a sort of surgical godfather to young surgeons who were working in England at the time and who were later sent there to gain special experience, and was able to help in securing them full opportunities for graduate education. The influence of this early seizing of opportunities had a stimulating effect later on the standard of surgical work, particularly in special branches such as anaesthetics, treatment of burns and blast injuries, surgery of the brain and the chest, orthopaedics and plastic surgery.

Colonel Fairley collected all available recent information and literature on tropical diseases, his own special subject, and the value of his work from that time onwards was of a magnitude difficult to assess. From the first he exercised a great influence on the attaining and maintaining of a high standard of medical work in all branches. An enquiry was made by the D.M.S., M.E. from War Office asking if he could be utilised as a consultant in tropical diseases for British forces in M.E. in addition to his work with the A.I.F. The War Office was quite favourable to this suggestion provided the Australian corps in the Middle East was agreeable, and for some time this arrangement held good. Apart from the help

Fairley was able to give there was also a great advantage in the close cooperation of British and Australian Medical Services, ensuring a common outlook and facilitating estimates for drugs and requirements, and coordinating the application of preventive methods.

Major Trethowan was a most active and successful liaison officer, and with the full and friendly cooperation of the D.G.A.M.S. and his staff was able to keep General Downes and his staff informed on details of all matters on which exchange of opinion and results were useful, and these were many. He visited France while the British Expeditionary Force was there and obtained much valuable information first-hand concerning the working of field units. Later, after the Dunkirk evacuation, he was also able to interview a number of medical officers with personal experience with units like casualty clearing stations and field ambulances. Some of the opinions thus obtained were of course unofficial, but it was interesting at a much later date to see how closely they corresponded with the opinions formed by others under similar conditions elsewhere.

The medical liaison officer had an office at Australia House. It is natural that the Australian Military Headquarters in England became a centre of earnest enquiry from Australian doctors, nurses and masseuses in England who wished to enrol for service. It is interesting to note how nearness to a grim situation alters the point of view, for some of the names at the head of the list belonged to far-sighted persons who even in 1938 wished to volunteer if international affairs should deteriorate to the point of actual warfare. At the latter part of 1939 numbers of Australian doctors in England wished to join the A.I.F. but were told that enlistment for the A.I.F. could not be made in England and it would be necessary for them to travel to Australia though no guarantee could be made of their acceptance.

DIVERSION OF A.I.F. CONTINGENT TO BRITAIN

On 18th June 1940, the Australian situation in England changed with the arrival of convoy US. 3 of troops which left Australia on 4th May 1940 and was diverted from the Middle East on account of the entry of Italy into the war on 10th June 1940. This was part of a larger convoy, the whole of which had been designed for the Middle East, and as the destination of some of the ships had been altered *en route*, some of the distributions of units were curiously unbalanced, and called for adjustment. With these troops there were, in addition to the usual complement of regimental medical officers, medical staffs of the 2/3rd Australian Field Ambulance commanded by Lieut-Colonel K. B. Fraser, the 3rd Australian Special Hospital under command of Major D. B. Loudon and seventy-seven members of the A.A.N.S.

Major Trethowan met the A.I.F. contingent on its arrival at Gourrock in Scotland on 16th June 1940 after it had travelled round the Cape of Good Hope, and assisted them in the arrangements made for them. From the Australian section of this convoy 459 sick were landed, including a number of officers and nurses. Arrangements had been made to accommo-

date them in five different hospitals and some difficulty and delay were experienced in getting the sick ashore and into hospital. This body of troops, like so many, had trouble with epidemic disease while in transit, especially mumps. The main force was sent to Salisbury Plain where accommodation had been prepared and some provisional medical arrangements had been made by Trethowan.

Owing to the distance from port of disembarkation care was necessary lest men should be absent from their units unduly long or be otherwise out of touch with the main body. Hence Major L. G. Hill of the 2/3rd Field Ambulance and a few orderlies were left in the Glasgow area to keep track of these men. He rejoined his unit a month later and was able to give considerable assistance to the Australian Records Section during this time.

Some 8,000 men were to be cared for on Salisbury Plain, and the problem was to make arrangements which would enable the Australian troops to be looked after by their own medical units. The chief difficulty was that the only medical holding units available were a special hospital and a field ambulance; an Australian general hospital was needed, but only a restricted staff was available for the purpose.

Two days after settling into the camp area these questions were taken up with the British Army Medical Directorate. Fraser, who had left Australia as the commanding officer of the 2/3rd Field Ambulance was appointed A.D.M.S. of the A.I.F. in the United Kingdom and with Trethowan his D.A.D.M.S. he called on the D.G.A.M.S. and met a number of his staff. The establishment of an Australian general hospital was discussed and given sympathetic hearing. Naturally a considerable amount of reorganisation was necessary. Colonel J. H. Anderson was appointed as A.D.G.M.S. in England, and from this time onwards acted in this capacity till after the end of the war, and gave outstanding service.

MEDICAL ORGANISATION

The Australian force in the United Kingdom was organised into two mixed brigades, with force troops and a fixed echelon organisation. Major-General H. D. Wynter commanded this force and gave Colonel Fraser every assistance and support in the often difficult and unexpected problems related to the medical care of the A.I.F. in England. This force required a more extensive medical service than that existing at the time of disembarkation; especially as an epidemic of mumps which had broken out had not yet abated. Therefore the following arrangements were made. Each camp was provided for by a medical inspection centre, and each battalion had its aid post. Major L. McKeon, promoted lieutenant-colonel, assumed command of the 2/3rd Australian Field Ambulance, and this unit was split in two, the other moiety forming the 2/11th Australian Field Ambulance, under the command of Lieutenant-Colonel T. Parry. These units were organised rather upon the lines of light field ambulances, and were brigaded in the usual way for camp purposes.

The 3rd Special Hospital under Lieut-Colonel Loudon was established in tents in the Tidworth area soon after arrival and, though the conditions were rather primitive, worked steadily for the first month until its establishment was absorbed into the 2/3rd Australian General Hospital. After this date all cases of venereal infection were admitted to an isolation ward of the A.G.H.

The establishment of a general hospital was the most difficult task of organisation. Only the most general arrangements had been discussed at first, but it soon became evident that there were great difficulties in the way of obtaining a satisfactory degree of autonomy for an Australian hospital. It must be realised that the only British military hospitals were in camp areas, and that most of the hospital care in Britain devolved on the Emergency Medical Services, an organisation different from that adopted in Australia. Another factor which possibly complicated arrangements was the recent evacuation of Flanders and France, one result of which was temporary surplus of service medical officers and nurses. Two military hospitals were already working on Salisbury Plain, but owing to the small civilian population there was no hospital under the Emergency Medical Services within short distance. A good site was available at Chepstowe, but "G" Branch thought it was too near Bristol, which was a target area. A new military hospital was just being completed at Shaftesbury, and efforts were made to establish an independent Australian hospital wing of 300 beds there. Further interview with the D.G.A.M.S. showed that this was not regarded as practicable, the alternative suggestion being to attach Australian medical officers and nurses to the staff when the hospital was opened. However, satisfactory arrangements were made with the E.M.S. organisation by the A.D.M.S., mainly through the interest and help of Sir Thomas Dunhill, Professor Fraser, the Director-General of E.M.S. and Dr Allen Daley of the London County Council. Accordingly 360 beds were made available in a wing of the King George V Sanatorium in Godalming, with complete control by the Australian military administration. The cooperation of all concerned was much appreciated by the Australian force whose responsible officers were most anxious to carry out the policy of caring for our own sick in our own hospitals.

Lieut-Colonel Loudon commanded the newly formed general hospital which was opened on 30th July 1940, and its medical officers were derived from the various units, including some officers originally intended for the 2/3rd and other Australian general hospitals. A general hospital usually has the advantage of selecting its staff: this was not possible here, and the unit took some time to settle down, but when properly established combined well and did good work. It was not easy to supply general duties men and orderlies, and after a few months it was impossible to get "A" class men for these purposes and those of the "B" class category only were available. It was found that these were on the whole not satisfactory, showing that in many cases it is not mere possession of a physical disability which results in the regrading of a soldier to a lower physical category. In order to eke out the numerical slenderness of the general

duties staff some female domestic help was obtained from civilian sources.

The hospital consisted of newly built huts next to the permanent building of the Sanatorium; these included an operating theatre block in which accommodation for an X-ray service and a dispensary was provided. Routine pathology was carried out by Captain C. B. Cox. An original team of two surgeons, an anaesthetist and a theatre sister was organised by Major K. Ross, and was available to the Emergency Services. Major N. Eadie set up an ear nose and throat department. A special isolation ward staffed by some of the original members of the 3rd Australian Special Hospital provided treatment for venereal disease, and a prophylactic depot was also set up in London. No specialists were available for X-ray work, eye conditions or anaesthesia. Nursing staff was fully available for all needs and some nurses worked in neighbouring hospitals. The hospital suffered from the drawback of being rather distant from the area where the troops were concentrated.

Australians serving with forestry units in the north were much more distant, but their medical care was supervised by an Australian medical officer detailed for that purpose. Fortunately, the Emergency Medical Services helped in the supply of hospital equipment, including instruments. Some deficiencies were supplied by local purchase.

The question of stores was actually rather a curious one. Some medical equipment intended for the 2/1st Australian General Hospital in Palestine was carried with the convoy, but it was not used in England, and was kept packed, eventually being safely received a year later by the rather incredulous A.I.F. in the Middle East. Even a few private gifts unofficially consigned to officers of the 2/1st A.G.H. and packed with these stores arrived safely. The ordnance equipment of the 3rd Special Hospital was available also, but in view of the local arrangements made with the E.M.S. in England it was thought better to retain this till this unit once more was established in independence. With the convoy was also an advanced depot of medical stores commanded by Major W. G. Masters. This was fortunate, as there was considerable demand upon expense stores, to supply not only the needs of the medical units but also those of the newly formed battalions of the force. After considerable difficulty a suitable building was obtained close to all the camps, and thereafter these supplies flowed smoothly. Other stores were obtained through various channels, and rations for the hospital through the King George V Sanatorium. Three special dental units were with the force. Of these one was absorbed into the 2/11th Field Ambulance. The dental officers found that certain deficiencies in equipment limited activities at first, but local purchase made good these needs and the later provision of electric power facilitated their work. The amount of dental work to be done in the force was described as "amazing".

Something more may now be said of the splitting of one field ambulance into two. After considerable discussion and, so far as Fraser was concerned, not a little struggling, an establishment of 176 was agreed upon. Some trouble was found in bringing the number of vehicles to the full

quota for the 2/11th Field Ambulance and there was a corresponding delay in securing men for transport duties in this unit. The organisation comprised an administrative headquarters of eight, a dressing station section of sixty, a bearer section of sixty-four and forty-four A.A.S.C. attached. There were six medical officers, quartermaster, transport officer, and dental officer, nine in all. The transport provided was decidedly sketchy, the quota being only eight motor ambulances. Fraser pointed out that should local conditions demand the full use of these units in a detached force this number would be totally inadequate for evacuation behind the main dressing stations. The above organisation provided for the formation of a main dressing station by the headquarters and dressing station section, and the bearer section was designed to be split into four small mobile sub-sections which could act as collecting posts or combine to form larger stations. Sufficient equipment was carried in a 30-cwt. truck to allow each sub-section to form what would in effect be a small advanced dressing station. Actually the organisation eliminated the A.D.S. as a necessary part of the arrangements in action. As we shall see, this development of field ambulances was exemplified in experiences on a number of fronts, and the trend towards mobility is obvious. It is interesting to see how the potentialities of what is virtually a type of a light field ambulance were realised in this detached force in England, whose destiny was then quite obscure. The whole of the equipment, ordnance, and medical, of the 2/11th Field Ambulance was supplied from British sources and the standard requirements of the British light field ambulance fitted in very satisfactorily with the unit's needs.

In passing it may be mentioned that satisfactory arrangements were concluded for the supply of blood, liquid serum and dried serum and plasma from the Emergency Transfusion Services. The last problem to be solved was that of convalescence. A convalescent home was established with a small staff at Windlesham Moor, a beautifully sited home generously made available by Mr William Clark. Few alterations were necessary to enable accommodation to be provided for seventy-five men, and there was ample space for huts if necessary. Arrangements were made for officers through the kindness of Lady Frances Ryder, who helped in the same way in the last war. This home was used for some months. Later convalescents were also admitted to a British convalescent depot at Westbury, usually only for short periods, avoiding undue separation from their units.

Naturally it was most advantageous for the medical and dental officers to take the unique advantage of doing special post-graduate work in England. Though staffs were always rather meagre, facilities were given, and the help of Sir Thomas Dunhill, Colonel Fairley and Colonel Anderson in this as in other matters was invaluable.

WORK AND TRAINING

Series of lectures by the Australian consultants were given to the officers in the Salisbury Plain area. Special instruction was also available

at the post-graduate school, Hammersmith, at various hospitals where the treatment of burns and war wounds and other work was demonstrated, and at schools of tropical medicine and chemical warfare. Selected officers were able to see the recent advances in certain experimental work, and in specialties such as thoracic, plastic and neurosurgery. The dental officers found great interest and benefit from opportunities to study the emergency treatment of facio-maxillary injuries and the work being done in England by specialist surgeons. Facilities were also available in England for special study in occupational therapy, but at this time the Adjutant-General and the D.G.M.S. of the Australian Army thought that the local facilities were sufficient.

During the remainder of 1940 and the early part of 1941 the Australian troops in England maintained a good standard of health. A few cases of cerebro-spinal meningitis occurred, mainly in the early months, and some concern was felt lest there might be a flare-up when the troops were closely confined on transports when later on they left for the Middle East. However, this fear proved groundless. Before the arrival of these troops there had been a widespread epidemic of respiratory infection in England during the winter months. This was described in the Press as influenza, but it was really a variant of the common cold with the usual upper respiratory tract infection, which appeared to have originated from the expeditionary force in France. A similar epidemic broke out in September 1940 but did not give rise to any anxiety. Acclimatisation of the troops was assisted by a move from tents on Salisbury Plains to hutted barracks at Colchester, which took place in autumn, and was in every respect advantageous.

Routine medical and surgical work was carried out up till March 1941 by the 2/3rd Australian General Hospital. This hospital in addition to caring for Australian soldiers, looked after the 29th New Zealand Battalion and undertook sick parades for the 11th Battalion of the Queen's Royal Regiment, both of which were stationed in the Godalming district. The two field ambulances performed camp medical duties and undertook training as well as tactical exercises. Special emphasis was placed on anti-gas training on account of the possibility of chemical warfare being of great military importance at that stage of the war.

Passive air defence was also studied; and practical training was instituted, and shelters were provided. Some air attacks occurred, but these were not of significance. Alerts were frequent at Godalming, but no bombs fell very close to the Australian areas. The camp area at Bulford was attacked by machine-gunning from the air on one occasion, but no damage was done. After November 1940 air raids ceased to be anything but a nuisance, and there was no need to use the shelters. In this the Australian troops were fortunate. In October 1940 Colonel Anderson in a semi-official letter to General Downes described the difficulties in securing enough rest in London, and expressed the opinion that none but the fittest should be sent there. From the early part of September for forty-four consecutive nights there were bombings and not a day passed without

alerts. During one night some 200 tons of bombs were dropped in the London area.

The question of general physical standards of troops of course came up while the Australians were in England. They had the same difficulty of disposal of unfits as the force in the Middle East. It was found that some unsuitable men had been accepted for service; in some instances false statements had been made by the recruit in his personal declaration.

Soon after the arrival of the force in England a suggestion was made by the British Medical Directorate that Australian casualties from the Middle East should be sent to the United Kingdom if they were likely to become fit within a short time, and otherwise to Australia or India. This suggestion arose from the position then obtaining with regard to sea transport through the Mediterranean and the Red Sea. If the Mediterranean was closed casualties could either be sent to Australia direct or to a base in the Indian Ocean. These matters were duly passed on by the medical liaison officer, but the Australian reaction was not favourable to the sending of sick to the United Kingdom, though the question of other bases was under consideration.

It would hardly be expected that the subject of malaria would arise in England, but some men after arrival had relapses of a benign tertian infection previously acquired in the Pacific zone. The question was raised as to their suitability for retention in the force, particularly for service in the Middle East; the British Director of Pathology thought they should be rejected, but Colonel Fraser decided that such men, if otherwise well, were quite fitted for further service. This decision was undoubtedly correct and in line with the intensive experiences of the later years.

Late in 1940 arrangements were made for transportation of the Australian force in England to the Middle East leaving behind the forestry companies. The troops left in several flights, the first on 18th November. The hospital remained open until most of the force had left in order to deal with the sick and to gather up the chronically ill and the unfit. The first party from the hospital embarked on 17th March 1941, the last ward having been closed down on 13th March. The ordnance and medical supplies obtained through the Emergency Medical Services reverted to the original service, excepting special equipment procured by local purchase. By May the medical units had arrived in Palestine. The 2/3rd A.G.H. was retained on paper on the Order of Battle, but with the coincident arrival of the 2/5th and 2/6th General Hospitals and other hospitals, the immediate need for it did not exist. There was some uncertainty about its future after the Grecian *débâcle*, but it did not work again as an active unit. However, the episode in the United Kingdom illustrated well the value of flexibility and adaptability in organisation which enabled the rather meagre medical establishments with the Australian force in England to fulfil all requirements.

CHAPTER 7

BARDIA AND TOBRUK

DECEMBER 1940 brought to the 6th Australian Division the dramatic change from training to action. In June 1940 Italy entered the war, and General Sir Archibald Wavell, the British Commander-in-Chief in the Middle East, confronted two large Italian armies in Libya and Abyssinia with a composite force of Empire troops. This included a British armoured division, a division from India, and incomplete divisions from Australia, New Zealand and South Africa, and was dispersed from Palestine to Kenya. None of these troops were fully equipped or trained. In September, a large Italian force invaded Egypt as far as Sidi Barrani; it was attacked on 9th December by British and Indian forces and was driven back to Bardia with heavy Italian losses. During this battle Indian troops were sent to Abyssinia to resist offensive action by the Italian army there, and the 6th Australian Division under Major-General I. G. Mackay was chosen for the coming drive against Bardia.

MEDICAL UNITS

At the beginning of December the three field ambulances of the 6th Australian Division, the 2/1st, 2/2nd and 2/7th, were grouped in the areas around Amiriya and Burg el Arab, waiting news of movement. Their training was well advanced, sharpened by recent brigade exercises under conditions somewhat comparable with those of the desert farther west. Most of the seasonal illness, chiefly sandfly fever, was over with the advent of colder weather. An outbreak of diphtheria in the 17th Brigade had caused temporary concern lest it should spread, but this had disappeared. Septic sores, too, which had been prevalent earlier, had yielded to close attention to personal hygiene and early vigorous treatment. This passing sickness had caused some inconvenience to the men in medical units as among the combatants, not only from the disturbances themselves, but also from the loss of manpower and interruption to training. To send a man to hospital in a base area and to have him placed on the "X list" was to lose him often for an indefinite period, usually without much chance of prompt adequate replacement. This difficulty was lessened by arranging that men sent to a casualty clearing station would not be placed on the "X list" unless they went farther back to a hospital. But these troubles were over, and the men were keen, toughened and ready.

Of the field ambulances, the 2/1st was the most thoroughly trained. Its commander, Lieut-Colonel A. J. Cunningham, had taken full advantage of all opportunities for field training since the arrival of the unit in Palestine with the first flight from Australia. The 2/2nd Field Ambulance, commanded by Lieut-Colonel H. G. Furnell, had likewise worked hard since its arrival in May, and had trained assiduously in Egypt since October. The 2/7th Field Ambulance commanded by Lieut-Colonel L. E.

Le Souef had so far had fewer opportunities, having only arrived in Egypt from Palestine in November, but had keenly concentrated in field exercises in the appropriate terrain for the short time available. The unit's equipment was not complete and some of it was not of good standard, such as the stretchers, which lacked robustness and fitted poorly into the racks of the vehicles. Poverty of vehicles was, however, its chief deficiency; this troubled Le Souef greatly, and it is not surprising that he made strenuous efforts to obviate the risk of being left behind.

All the commanders and senior officers of these medical units were given opportunities to visit the forward areas and to gain first-hand experience of what the British medical services were doing there under the new and difficult conditions. Their reports show how free and full was the cooperation of their hosts and how they profited by what they saw. The 2/1st Australian Casualty Clearing Station, commanded by Lieut-Colonel J. K. Adey, had steadily consolidated its training by such medical activity as was possible. The officers and men had become resigned to frequent moves while in Palestine, gaining perforce much experience in packing and setting up again, and on arriving at Amiriya on 12th December they welcomed the opportunity of opening a temporary hospital even in that dusty place. Incidentally a shortage of pyjamas, so essential for the work of a casualty clearing station was promptly relieved by the Red Cross. Though the unit was under control of the Middle East Headquarters and not of the 6th Australian Division it was evident that it would have a part to play in areas rather remote from hospitals.

The 2/1st Australian Field Hygiene Section, after useful experience in Palestine, under Captain R. Drummond, had been in Egypt since September, and were now skilled in that curious compound of supervision, extemporisation and scientific method that makes up the work of a hygiene section in the field.

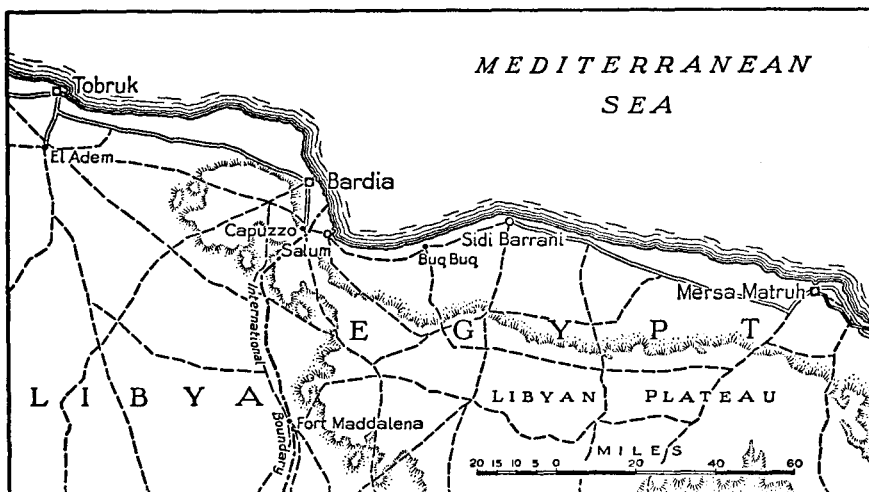
The regimental medical officers, perhaps the most vital individual links in the medical services of the army, were now well trained for their jobs. It takes time to weld medical knowledge to such a specialised purpose, to learn to use limited resources with judgment and economy, to set up and equip aid posts, to move them at short notice, to extemporise cheerfully and above all to know men under all conditions. "A good lot" Colonel H. C. Disher, A.D.M.S. of the 6th Division called them in his diary. Individuality had some freedom of expression in the details of medical arrangements for the aid post of each combatant unit; ingenuity was shown in the fitting of a utility truck as a mobile regimental aid post, such as that designed by Captain Paul Tomlinson, of the 2/4th Infantry Battalion.

MOVE TO THE WESTERN DESERT

The 2/1st Field Ambulance received warning of movement on 10th December, the day after the British operation against Sidi Barrani, and two days later when they moved out with Allen's 16th Brigade, through blinding dust, the heartening news of the rout of the Italians was being

received. Cunningham set up a main dressing station at Sidi Haneish, and within three days his men were watching no less than some 7,000 Italian prisoners of war coming in. On 15th December the dressing station treated its first actual casualty in the field, an Arab whose encounter with a "thermos" bomb cost him his hand. The danger of handling these destructive contrivances was thus early emphasised: it seemed likely that injuries of the extremities would be often seen in the desert.

The victory at Sidi Barrani hastened action for the 6th Division, for these Australian troops were now ordered into the battle zone, where they were to replace the 4th Indian Division, which was to reinforce the forces in Abyssinia. The 16th Brigade was therefore moved forward by road past the recent field of battle, towards the front before Bardia. Meanwhile the 17th Brigade waited at Sidi Haneish and the 19th Brigade had been warned to await possible embarkation at Alexandria. The 6th Australian Division was thus spread over an area extending westward from Alexandria to positions facing the fortress area of Bardia, where it was now evident their proving was to be, in spite of false rumours that the Italians were abandoning the town. On 18th December, Disher had notice to move forward, and after a week-early combined Christmas dinner at "B" mess left with the advanced headquarters of the division next day; Major N. H. Saxby, the D.A.D.M.S. stayed with the rear headquarters at



Ikingi. The 2/2nd Field Ambulance had not yet come up, its advance party was then on the way to Sidi Haneish. The 2/7th Field Ambulance was at Burg el Arab, and was instructed to hold a detachment ready at short notice to accompany the 19th Brigade in its proposed sea movement. The unit now had its quota of ambulances, but still had deficiencies of other vehicles. It was already evident that medical administration in forward areas would have to cope with widely separated units.

At Sidi Barrani the 215th British Field Ambulance now occupied the Italian Hospital, and on 20th December, after inspecting with admiration and not a little envy captured Italian medical equipment and tentage, Colonel Disher met in conference Colonel F. G. A. Smyth (Royal Army Medical Corps), D.D.M.S. of XIII Corps, whose efficiency and friendly cooperation were evident from the first. The general outline of a medical plan was discussed and approved. The difficulties ahead were not underestimated; of these the shortage of vehicles was most serious. The 16th and 17th Brigades could not have been moved forward without their using borrowed and captured trucks, and tapping the resources of the forces in Palestine. Vehicles had formidable obstacles to overcome, long distances, rough and ill defined tracks, featureless desert and, near the coastal escarpment, steep gradients. The divisional plan threw most of the work at least in the early stages on the 2/1st Australian Field Ambulance, whose main dressing station was at Salum. As the 16th Brigade moved into position advanced dressing stations were set up, one under "B" Company of the field ambulance at the junction of Halfaya Pass road and the main road and one of "A" Company near the brigade headquarters in decrepit buildings and tents just inside the wire on the border of Libya. Here an operating tent was set up, well dug in and ready for work. On 19th December the Italian bombers greeted the new arrivals by attacking a convoy of ambulance vehicles going up Halfaya Pass. On 20th December the dust was "beyond description". Everyone wore eye protectors from respirators in order to see at all, and after a brief deceptive lull, during which there was another air attack, the dust blew in heightened rage through the night. Compasses were issued to drivers of vehicles. Water trailers were found an encumbrance to field ambulances and were not used; water carts were necessary, but most useful of all were 2-gallon tins, which could be carried on any vehicle.

The medical plan required the 2/1st Australian Field Ambulance to treat personnel of the 16th and 17th Brigades and evacuate them with the assistance of one company and four ambulance waggons attached from the 2/7th Field Ambulance. The 2/2nd Field Ambulance was to be held in reserve, ready to go into Bardia when the town was taken. The 2/1st Field Ambulance was to work a chain of dressing stations along both sides of the road, with checking posts near the advanced stations, concentrating patients on the main dressing station at Salum. Smyth agreed that a surgical team under Major J. O. Smith of 2/1st Australian Casualty Clearing Station should be sent forward to join the 2/2nd Ambulance, for probable use during the assault on Bardia.

On the same day as Smyth and Disher discussed their plans a conference began at the headquarters of British Troops in Egypt to settle wider aspects of treatment and evacuation of the sick and wounded. The D.M.S. Middle East, Major-General P. S. Tomlinson, the D.M.S. A.I.F., Brigadier S. R. Burston, and Colonel R. G. Shaw the D.D.M.S. British Troops in Egypt, after discussion agreed to the general principle that all Australian sick and wounded should as far as possible be cared for by

Australian medical units. It was proposed that the 2/1st Australian Casualty Clearing Station should take over the dressing stations of the 2/1st British Field Ambulance in Mersa Matruh. The 2/2nd Australian C.C.S. which had recently arrived in Palestine, was to move to Amiriya and remain packed, ready to take the place of the 15th British Casualty Clearing Station if this unit should move on from Alexandria. The 2/1st British Field Ambulance was to be retained as a corps reserve and to move to Amiriya, to run a local reception station there, and join up with the 18th Brigade. The 2/9th Australian General Hospital was expected shortly from Australia, and was to be sited at Amiriya. H.E.M.S. *El Amira Fawzia*, a ship belonging to the Egyptian Government, was available as a transport, and though it had neither the status nor equipment of a hospital ship, it was suitable for the short run between Salum and Alexandria or Haifa. This ship was armed, but not permitted by the Egyptian Government to travel past the western boundary of Egypt. Its draught was suitable for manoeuvring in and out of Mersa Matruh and Salum, and it had a satisfactory turn of speed. An Australian medical staff of three officers and fourteen other ranks was allotted for work on board. Further details could not be worked out at this conference till Burston had made a reconnaissance of the forward areas, and he therefore went forward to see the conditions for himself, the discussion being resumed on his return.

It was then agreed that advanced dressing stations were needed in the Fort Capuzzo area and a main dressing station in the Salum area. At Sidi Barrani the headquarters company of a field ambulance strengthened by surgical teams would act as operating and holding station, whilst at Mersa Matruh, the railhead, a casualty clearing station would be placed. The direct road from Bardia *via* Salum was good but unduly exposed to shell-fire and bombing, and the alternative road was rough and traversed the steep winding Halfaya Pass, necessitating slow and uncomfortable travel for wounded men. The main road on to Sidi Barrani through Buq Buq was rough and covered with loose metal and while some of the secondary dirt tracks were fairly good, the heavy traffic had broken many parts up into a succession of dusty potholes. On to Matruh the road was good for half the journey; the rest was rough but tolerable. The journey by road of some 135 miles from Salum to Matruh might take anything from twenty-four to seventy-three hours.¹ Burston therefore thought that in the interests of seriously wounded men a casualty clearing station should be located in the Salum area, from which evacuation could take place by sea. It could be sited at the bottom of the pass, secure from shell-fire. The desirability of air ambulance transport was stressed at this conference. As far back as 17th September Major-General Tomlinson had asked Burston if the Australian Red Cross could supply two air ambulances for

¹ Distances will be usually given in miles, as this measurement conveys a more concrete idea to most English-speaking readers. In the Middle East, where all distances were measured in kilometres the kilometre mark was frequently used as a place name by members of the services. This custom will occasionally be followed where it is appropriate.

use in the Western Desert. Attempts to obtain them quickly from England or America had been fruitless, and Colonel Harold Cohen, Australian Red Cross Commissioner in Middle East had cabled to Australian Red Cross headquarters an urgent request for supply of two air ambulances, suggesting conversion of commercial aircraft. All were agreed that two air ambulances capable of carrying eight to ten stretcher cases would save many lives, but efforts to obtain suitable aircraft had so far been unsuccessful.

In view of all these circumstances it was decided to modify the previous plan by bringing the 2/2nd Australian Casualty Clearing Station to Salum, or to Bardia if the assault on this fortress area met with early success. Sea evacuation was to be used if possible, direct to Kantara, and land evacuation by motor ambulance convoy to the 2/1st Australian Casualty Clearing Station at Matruh and thence by hospital train to an Australian general hospital, either at Kantara or Amiriya. Surgical teams would be needed as far forward as possible, with facilities for holding patients for at least seventy-two hours after operations. Such arrangements were designed not only to provide attention for Australian soldiers in Australian medical units, but also to secure such comfort and expedition in transport as was possible.

Even in the coastal area east of Salum travelling was difficult and uncomfortable. Off the roads wheel marks were only just visible on the grey dusty soil of the desert, which along the coastal area was flat, with only small undulations. This grey desert, studded with low bushes about a foot high like salt bush, and about two to four feet apart, gave reasonable riding for a wide tracked vehicle which could attain fairly high speed, but the transportation of the sick was another matter. West from Salum the roads rose by tortuous hilly tracks on to the escarpment, a high plateau which fell away quickly towards the Mediterranean and was a prominent feature of the landscape from the sea. Every vehicle and every breeze whipped up the loose surface into dust, and to the discomfort of cold winds was added that of a gritty pall that pervaded everything and lowered visibility to almost nothing. The risks of air attack and the shortage of technical supplies, and particularly of water compelled caution in movement. R.M.Os. moving with their units whenever long stops were made removed the pannier containing shell dressings, water, surgical haversack and medical companion to a safe distance from the truck.

ARRANGEMENTS FOR THE ATTACK ON BARDIA

On 22nd December Smyth and Disher had conferred again, settled details of the forward arrangements, and gained a clear picture of those farther back. By the 24th, the 2/2nd Australian Field Ambulance had reached Salum, and settled temporarily on a sandy flat covered with bushes near the main dressing station of the 2/1st Australian Field Ambulance, and a mile east of the corresponding station of the 3/3rd British Light Field Ambulance. Here, below the Halfaya Pass the Italian bombers could be seen attacking ships in the bay, and occasionally, the

shells from "big Benito" exploding over Salum. The coast road was strewn with arms, clothes and derelict vehicles, but supplies of abandoned material could be obtained and were very useful. The water was unpleasantly brackish, and supplies were drawn from Buq Buq. Two days later the main dressing station of the 2/1st Australian Field Ambulance moved forward just inside the Libyan frontier wire, where its "A" Company had been for some days, the first medical unit of the Second A.I.F. to set foot in enemy territory. "B" Company of the 2/2nd Field Ambulance headquarters moved on by trucks and motor ambulance convoy to Sidi Barrani.

Meanwhile on the 24th December a detachment of men from the 2/7th Australian Field Ambulance was sent to the 2/1st Field Ambulance. A few 30-cwt. trucks had reached the 2/7th Field Ambulance by this time, but supplies and equipment were still incomplete and such transport as the unit had was quite inadequate for movement. Realising the need for more vehicles forward Disher had sent for three ambulance waggons from this unit and four from the 2/2nd Field Ambulance in order to ensure contact with all the medical officers of fighting units.

Cunningham's ambulance had an early trial of its organisation when on the night of 24th December an air raid caused a number of casualties for which blood transfusions were required. The need for a blood bank was felt, but dried plasma was used with good effect. During these early days before Bardia the unit was found to be working smoothly, and excellent cooperation was achieved with the Royal Army Medical Corps, the British motor ambulance convoy, and the embarkation officer for Salum, so that no obstacles were expected in evacuation of the wounded. Much valuable Italian equipment was obtained, including instruments and autoclaves. The latter in particular were most welcome, as already they were essential for the independence of a field ambulance, and being produced only in small quantities in Australia through shortage of copper, were precious as gold. By the 28th December the whole of the 2/1st Field Ambulance was concentrated in Libya and "A" Company of the 2/2nd Ambulance serving with the 17th Brigade was also under Cunningham's command. Advanced dressing stations were set up near the 16th and 17th Brigade headquarters, and the main dressing station was near advanced headquarters of the 6th Division. In the battalions the men were on the whole well, in spite of dust storms and severe cold. Daily bombing was a test of nerves. Captain C. H. Selby, R.M.O. of 2/1st Battalion found that a number of younger soldiers had nervous dyspepsia and were emotional, but a hot meal and a sedative were effective treatment. Captain L. Armati noted that rheumatic symptoms were common in the 2/2nd Battalion, but found no relation between this and the bombing. In one air raid the R.M.O. of 2/3rd Battalion, Captain E. J. Molesworth had his R.A.P. truck damaged. Not all units had paid sufficient attention to the men's feet; some had tinea and numbers were wearing poorly fitting boots. A few septic sores appeared, but were not troublesome.

"Digging in" was a difficult problem, both for hygiene and shelter, as rock was often met some six inches under the sand. Camouflaged tarpaulins were found useful for shelter anchored by petrol tins filled with sand. Training of stretcher bearers was being carried out: lectures incorporated instruction on the plan of battle; in some units a sand model was used. Four stretcher bearers were allotted to each company: motor transport was used as far as possible. Eight bearers were attached from the 2/1st Field Ambulance to each forward battalion and to the artillery, and at each battalion aid post there was an ambulance waggon and a bearer squad.

In addition Smyth had arranged for a section of the 3rd British Light Field Ambulance to open up shelters and take wounded. The Headquarters Company of the 2/2nd Australian Field Ambulance was kept in reserve "on wheels" and waiting until Bardia was captured, when it was planned to open an operating centre there. Arrangements were made for blood transfusion teams; volunteer donors were called for from the headquarters staff of the 2/1st Field Ambulance; the response was excellent, and lists of men arranged under their blood groupings were ready in the operating theatre. Trouble was experienced at this stage with the transfusion sets, owing to seizing of the caps and glass tubes, but adjustments were simply made.

Meanwhile Disher was reviewing his medical arrangements on the eve of the battle of Bardia and felt that his reserves were slender. Smyth agreed, and sent for Le Souef's ambulance to come forward. Actually this movement did not promise to be easily possible, owing to extreme shortage of vehicles, but it was desirable, especially in the event of heavy casualties. The preparations were made on the basis of 1,000 casualties for treatment and evacuation, but the strain was likely to fall even more heavily on the transport staff and their vehicles than on the medical side. It was realised that while 500 casualties could be easily handled, a number in excess of this would increase difficulties greatly. Already waggons from several sources had been pooled, and Disher felt that a mobile dressing station might also have advantages in this country. "We are in Libya now, and not in France, and we can't do in 1940-1941 what was done in 1914-1918. The conditions are quite different, and different also from the Palestine campaign," he wrote in his diary. Mobile sections were budded off from the companies, and they were already proving their worth in covering wide areas and giving prompt forward service. Not only were more ambulance waggons needed but also trucks with attachments like the Flint stretcher gear into which standard stretchers could be fitted. Requests had been made from the headquarters of the British Troops in Egypt since September, but without result. Vehicles were also an essential means of communications for medical services; already it was apparent that it would be wise not to be dependent on the usual channels but rather to send personal messages by drivers. Motor cycles were virtually useless in the desert, though Drummond thought he could use them in a hygiene section.

In order to maintain as far as possible unbroken contact between Australian wounded and their own medical people, Smyth had specially requested that an Australian post should be left below the escarpment for this purpose. This thoughtful gesture was much appreciated. A plan for a divisional rest station was also considered, at a site some miles along the Buq Buq road, where men could be sent who needed only a few days rest. The possibility of nervous disturbance was discussed also: already a little group of six cases of wounds of the feet had been reported, which were suspected to be self inflicted.

The 2/1st Hygiene Section was actively engaged in its personal duties. Water was scarce; only two pints per man per day could be allowed after cooking requirements were met. All the water used on the plateau was supplied by sea transport except that for motor vehicles, for which there was a not too plentiful amount of brackish water available in the Fort Capuzzo area. The nature of the ground made sanitation difficult. It was so stony that digging was an almost impossible labour, and shallow trenches were chiefly used for communal purposes at this stage. The dryness, the absence of flies, the activities of the desert beetles, and the ever blowing sand made the risk of contamination very small in the circumstances. Saxby had arrived on Christmas Day with the rear headquarters of the 6th Division, and Disher arranged that they should have joint quarters forward so as to keep in close touch. Major A. L. Dawkins of 2/7th Field Ambulance also arrived and was detailed as a liaison officer on the staff of the A.D.M.S.; his function was to maintain contact with the regimental medical officers and the advanced dressing stations. For a time Disher had acted also as A.D.M.S. for the 16th British Brigade on the right of the 16th Australian Infantry Brigade, but the 17th Australian Brigade had now come up and was relieving the British Brigade.

Now, on 28th December, it was expected that the assault on Bardia would begin about 1st January. At this stage it was found that the message sent to summon the surgical team from the 2/1st Australian Casualty Clearing Station had been sent in error to the 2/2nd C.C.S., and Smyth signalled again urgently, as time was short. Colonel Wallace, A.D.M.S. of the 7th British Armoured Division, was in need of several medical officers and the Australian A.D.M.S. agreed to lend him a medical officer to take charge of a section of the 3/3rd British Field Ambulance. In return Wallace agreed to take up to thirty patients should there be an overflow from Australian units.

The last two days of 1940 were spent by Disher and his two assistants in paying personal visits to all aid posts and detachments of medical units. Changes in brigade boundaries and unit locations and their dispersion over wide areas made it difficult to keep in touch with all medical officers. Care was taken to ensure that adequate reserves of stretchers, blankets and dressings were held at essential points, but it was realised that here too distance and rapid movement might disturb these arrangements. As usually happens some shortages were discovered almost at the last minute.

MILITARY PLAN

At the end of the old year all were eagerly waiting their first real trial. The task confronting the forces before Bardia was that of taking a very strongly held fortified area, in which the initial estimate of the Italian strength was some 18,000 to 20,000 troops. There was now good reason to believe that this estimate fell far below the true figures, and despite the disorganisation of the Italian forces at Sidi Barrani by the British attack, a tough struggle awaited the three Australian brigades with associated British artillery and armour. Bardia was surrounded by a double perimeter of defences, with an anti-tank ditch, wire and concrete strong-points at intervals. The preparations for the attack involved preliminary work by the engineers, who had to make a way through a minefield and tank traps, after an initial artillery bombardment. The plan for the assault was briefly, to seize and hold a sector of the western part of the perimeter while engineers filled in the ditch: the 16th Australian Brigade was then to break in, followed by the British armour. The initial push through the gap was to be made by a battalion of the 16th Brigade, followed by another battalion with tanks, turning south-east, and then by a third battalion which would advance to the east. Part of the 17th Brigade, after passing the perimeter, was to press on against a strongly fortified area to the south. Heavy casualties were expected from the movements.

MEDICAL PLAN

The general scheme of medical arrangements was designed to fit into this plan. One difficulty was that when the infantry followed into the defended area there would be for some time only one way in and out. It was hoped that if a lull succeeded this phase it might be possible to cut further tracks through the wire. The care of casualties depended chiefly on one Australian field ambulance, the 2/1st, reinforced by "A" Company of the 2/2nd. Wire cutters and gloves were issued to this unit so that the expected congestion of traffic through the single opening in the wire might be relieved if opportunity offered. Nightly patrols explored the enemy's outposts, after the tradition of their predecessors in the First A.I.F.; Major G. Young, a medical officer of the 2/1st Field Ambulance, went out one night with a reconnaissance party from the 16th Brigade to investigate the problems of transportation of wounded from the battlefield west of Bardia.

The vehicles of the 11th British Motor Ambulance Convoy were available for evacuation of wounded, and in addition the ambulance waggons of the 2/1st Field Ambulance were augmented by others from the 2/2nd and 2/7th Field Ambulances. It will be seen that the resources of the three field ambulances had been pooled to some extent; though the main body of the 2/7th had not yet arrived. The A.D.M.S. considered that the integrity of each unit was in the special circumstances much less important than such combined strength as they could give. No walking wounded collecting post was set up: it was regarded as impracticable as it could

not with certainty be located. It was arranged instead that lightly wounded men should be directed to the roads where they would be picked up. The use of a marker such as rifle stuck in the ground was advised, and arrangements were made for a number of empty A.A.S.C. vehicles of the first ambulances and some vehicles of the 6th Division, A.A.S.C. on loan to the A.D.M.S. to patrol the areas looking for such men.

It seemed as if the 19th Brigade might be too late for the action, as it was not expected to arrive till 3rd January. The 2/7th Field Ambulance was even more likely to be delayed, and was finding further difficulty in obtaining enough tentage for cover of casualties. One company of this unit had arrived at Salum with only sixteen stretchers and a few blankets and enough covers for forty men. The rest of this ambulance unit was immobilised at Matruh; its Army Service Corps vehicles had been taken for moving up the 19th Brigade. The medical arrangements were concluded without further reckoning on the presence of the 2/7th Field Ambulance. Fifteen motor ambulances were available for forward evacuation with possibly in addition any other vehicles obtainable. Three were kept at the headquarters of the 2/2nd Field Ambulance in reserve and were not to be used unless specially ordered; there was reason for believing they would be needed later when Bardia fell. Just inside the boundary wire a reserve of 40 stretchers and 600 blankets was held. Assurance was given to divisional headquarters that 500 casualties could be dealt with without undue strain. The motor ambulance convoy expected to be able to evacuate up to 300 in a day to Sidi Barrani, using some 45 cars. Final conference with ambulance commanders settled that stretcher bearers would be attached to all aid posts whether ambulances could make their way up to the posts or not. The regimental medical officers at first were doubtful if this would be necessary, but a few days' experience forward altered their viewpoint. They were advised not to keep all their outfit in a truck, but to place some for safety in a slit trench. In fact the neatly contrived aid posts on wheels lost some of their appeal under the prevailing conditions. In case of trouble in maintaining the planned route of evacuation an alternative route across country on the left flank was chosen. Here a "cab rank" of three ambulance cars was allotted; it would make the reserve a little lean but would save time. All routes for evacuation were plainly marked.

The surgical team had still not arrived, and a telegram was sent asking why the delay. The reason was the same stringency of transport which also hindered the arrival of tentage urgently needed for shelter of casualties. It was little use receiving approval for its issue from headquarters in Cairo, without means of bringing it up; in fact the instruction given earlier that medical units must not go to the Western Desert unless fully equipped could not be strictly obeyed. However, the Australian Army Service Corps and Signals Corps came to the rescue, and made available some extra huts and covers, there was also a cave, which in emergency could house about 100. Unfortunately, it looked as if the plan for a divisional rest station had fallen through; the site previously selected near Buq Buq

was untenable having been fouled by the Italians before they abandoned it.

On New Year's Day brassards arrived for medical personnel and were distributed. It was expected they would be required in two days' time, for the action was now timed for 3rd January. The extra respite was appreciated. It enabled more detailed preparations to be made including such matters as borrowing pressure lamps from the engineers for use by the 2/2nd Field Ambulance for emergency use in an operating theatre. Moreover, the long expected surgical team at last arrived on the eve of the battle. It included Major J. O. Smith, Captain F. D. Stephens, and four orderlies, thus doubling the number originally asked for, but the extra help was welcome and valuable. The presence of a team was expected to be a good influence in all ways, for news had come back from the casualty clearing station that closure of wounds attempted at aid posts had resulted in their breaking down. At least one surgical lesson was learnt before action, that the scope of work done at a forward post should be strictly limited.

Selected points were chosen beforehand at which aid posts could be established. Treatment at the battalion aid posts was aimed at dealing with shock, and bleeding; the proximity of an advanced dressing station provided for necessary surgical measures there. Each bearer carried a haversack, and a water-bottle of sweet tea. The R.M.O.'s box in his aid post contained dressings, instruments, tourniquet and morphine.

The medical situation on 1st January was briefly that the commander of 2/1st Field Ambulance was in charge of all ambulance units on top of the escarpment except the headquarters of the 2/2nd Field Ambulance which was held in reserve. "A" Company of 2/2nd Field Ambulance was to help in the general evacuation of the divisional front, and set up an advanced dressing station between the border wire and the western sector. Later this was left in charge of a mobile section, the remainder of the company returning to a site near the main dressing station. This station, the headquarters of the 2/1st Field Ambulance, was near Fort Capuzzo, about twelve miles from the western point of attack, and about seven from the southern. Here the emergency surgery was to be done under the direction of Julian Smith, and such patients as could not be sent on immediately were to be retained there. All available ambulance transport was placed at Cunningham's disposal during the battle, except that held in reserve at the 2/2nd Field Ambulance headquarters. All waggons carried some emergency equipment such as Red Cross flags, stretchers, splints, blankets, tourniquets and shell dressings. Below the escarpment "B" Company of 2/2nd had established a dressing station and could hold up to 100 casualties; this number could be increased in emergency by using the extra accommodation obtained from the Army Service Corps. It was further planned that on the fall of Bardia the commander of the 2/2nd Field Ambulance would then control the advanced dressing stations and companies of both ambulances, while the headquarters of the 2/1st Field Ambulance would be held in reserve, though still controlling the reserve dressing station of 2/2nd Ambulance's "B" Company just mentioned. It

was understood that if brigades moved, the advanced dressing stations serving them would come under brigade orders.

Not only the drivers of vehicles but medical officers found it essential to have full directions to given localities, and to use a compass. During movements in convoys this was specially valuable, as the regimental aid post truck was apt to lose position in picking up men who fell out or were injured and might easily be lost. Where wounded could be assembled in the anti-tank ditch the bearers were instructed to keep them there if possible till the medical officer saw them.

On 2nd January the day before the attack on Bardia, "A" Company of the 2/7th Field Ambulance arrived with 19th Brigade thus providing some additional medical reserve.

THE BATTLE OF BARDIA

With cheering optimism the General Staff of the 6th Division issued a warning order that the 2/2nd Field Ambulance was to be ready after the Bardia action to accompany the forces in an assault on Tobruk. In earnest of that hope the dawn attack began on 3rd January with a bombardment which, though not up to the standard of the Western Front in France, according to connoisseurs of the last war, was impressive enough.

The first casualty arrived at the main dressing station at 10.30 a.m. and shortly afterwards wounded were arriving in a steady stream. Arrangements for the collection of wounded forward were working well, and the regimental aid posts and advanced dressing stations were coping with the work. At the aid posts stretcher bearers were picking up men under fire, and Captains W. W. Gunther and R. F. Matthews, bearer officers of 2/1st Field Ambulance, went forward to the aid posts under fire to supervise the collection of wounded. Two stretcher bearers were wounded. Similar risks were constantly taken in the rescue of wounded men not only by the drivers of ambulance waggons of the three ambulance units, but also by the Australian Army Service Corps drivers. Two waggons overturned, but were put back on their wheels again. Occasional hitches occurred, as when an ambulance car was requested at an advanced dressing station to pick up several wounded; and it was later found that two cars of those previously sent forward to the aid posts were already waiting there. However, such little lapses may occur in the excitement of battle conditions, and the medical plan ran smoothly. Some of the aid posts were dangerous spots for a time, but Disher endeavoured to see that all posts were regularly visited by officers controlling the forward dressing stations so as to maintain contact with the R.M.Os. The centre post with the 16th Brigade commanded by Major R. H. Russell found things quieter later and was able to send out a mobile section with Matthews towards the perimeter wire. This was found useful by the post on the right flank as a staging post where men passing to the main dressing station could be inspected. The road from here was poor but at least was safe from shelling.



Bardia, 2nd January 1941.

In the initial movements of the 16th Brigade two squads of stretcher bearers of the leading battalion—the 2/1st—went through the wire to the wounded, and brought them back to the anti-tank ditch where there was a medical orderly in charge. Selby, the R.M.O., in going forward to reach wounded had to shelter from a barrage in the second line of defences. Armati of the 2/2nd Battalion and the medical parties reached the gap when it was broad daylight, but by the early afternoon all wounded had been cleared; 110 had gone through the main aid post. Captain R. S. Smibert of the 2/5th Battalion found difficulty in making contact with the field ambulance, and sent back some severe casualties in a truck meant for walking wounded. Later the routes to the collecting posts and the ambulance dressing station were cleared. More patients had to be sent back in trucks but by evening all had been moved to the main station. Even before noon the need for closer contact with the attacking troops of small sections from the advanced dressing stations was beginning to be felt, owing to the success of the advance.

Prisoners were pouring in, and thousands of them were sitting about on the roads dejectedly. They were an embarrassment and by no means an asset to general hygiene, but some were acting as stretcher bearers at the main dressing station where an Italian medical officer was attending his own wounded. Not all the Australian wounded were brought back to their own dressing stations, a few being cared for by the Italians. The Italian medical officers were cooperative. In the rounding up of prisoners taken by a party of the 2/1st Battalion under Sergeant I. J. McIntosh, an Italian medical officer agreed that both Australian and Italian wounded should be taken to a neighbouring Italian dressing station. On 4th January Australian cavalry occupied an Italian hospital near a road junction leading into Bardia and found some Australians there.

At the main dressing station the surgical teams worked on through the day. Major Smith's team and Captain C. R. Blomfield's (from the staff of the 2/1st Field Ambulance) carried out surgery of the emergency type only, and all men possible were passed on to the staging post at Salum; only those were held who were seriously wounded and could not safely be moved. By night most of the men had been sent on. Some delays occurred with the reception and sorting of patients. These were in some measure due to the records system, though the restricted accommodation in reception tents also played an important part. The quantity of clothing worn by the troops in itself caused delay. The removal of overcoat, jerkin, tunic and pullover before the shirt of a wounded man was reached often proved a slow task. Captain R. E. Chapple, dental officer, gave anaesthetics throughout the day and night. Blood for transfusion was taken from volunteers among the lightly wounded, and by the end of the day a reserve was in hand. Nevertheless the surgeons felt that a blood bank would be an asset, and that it would be an advantage to have the services of a transfusion team.

Disher's appraisal of the day's work was that it was "not bad, but just as well that there were so few casualties and that the enemy was not

the Hun". He felt a little worried that men might still be lying out in the desert, realising the difficulty of finding them. His reserve of ambulance cars proved useful, as rushes of casualties occurred first on the left flank and later on the right. The remainder of this reserve had not materialised, being apparently still somewhere back of Sidi Barrani. Full use was made of a dozen R.A.M.C. orderlies who arrived under their own steam from Matruh with no apparent destination. Prowling 30-cwt. lorries had been found of great value, nine were in use part of the day, and in the later part eleven. The experience of the day had emphasised that distances were greater than any contemplated in exercises, particularly when reckoned in terms of time. Even at this stage it was necessary to look to the morrow and see how forward moves could be covered by medical detachments using the men and vehicles available. At dark a secret warning came from the divisional headquarters that a move to Tobruk next midday was probable. It was evident that a field ambulance must be ready to move on; and that an extra company would be required to establish an intermediate staging post on the seventy mile journey. The 2/1st Field Ambulance was fully engaged already. The motor ambulance convoy would also be fully occupied, and the field ambulance cars would have to attend to transport back to the main dressing station. The 2/2nd Field Ambulance did not have full transport and the 2/7th could only move about one company at a time. Such was the problem now confronting Disher in his future medical arrangements with the battle of Bardia still going on. The main dressing station had been well cleared by ambulance convoy through the day but traffic down the pass had to cease at night. By morning the dressing station would again be full, as the ambulance cars worked through the night bringing in casualties. If only the number of waggons available to each field ambulance had been twelve instead of eight the solution would have been easier, and the A.D.M.S. would have fewer uncertainties for the morrow.

The morning of 4th January brought delays in the forward movement: victory was not yet complete. The Italians in the northern sector were now demoralised, but there was still resistance in the southern sector. It was evident that the Italian forces in Bardia were greatly in excess of the numbers originally estimated. The true figures were now believed to be about 40,000, for even allowing for difficulties in counting prisoners during an action, it was possible that some 20,000 Italians had been taken prisoner.

A further complication in the action was the bringing up of the 19th Brigade, which in accordance with the altered plan was to attack on 5th January, with a squadron of the 6th Division Cavalry and some British tanks. A change of plan was necessary to cope with this final attack on the southern sector by the 19th Brigade on the morrow, and one of the advanced dressing stations was moved to a more strategic position. At daybreak vehicles of the 2/7th Field Ambulance went off to Salum to bring back the rest of the company. The staging post below the escarpment had been full during the night, but arrangements were

made with the 3/3rd British Field Ambulance to handle the onward transport of the wounded. By 10 o'clock in the morning of 4th January the proposed onward movement to Tobruk was cancelled, as the position on the southern sector was not secure enough. Julian Smith had been sent to "A" Company of the 2/2nd Field Ambulance to be ready for forward movement; this was now postponed.

In the early afternoon fresh plans were issued for the continued assault. The 19th Brigade had to advance from the north-west so as to attack the position in the southern area, where the Italians were holding out. Some confusion occurred as the result of this unforeseen change of plan. The proposed onward movements had made fresh dispositions of the ambulance dressing stations necessary, and while Cunningham was out on reconnaissance engaged in this task, Disher arrived with the news of the altered plan. By the time the necessary adjustments had been made the day was waning, but before night fell every post and every officer involved had been informed of the new arrangements. The difficulties of distance were again in evidence, and the only certain method of communication in the desert was personal contact.

Just at dark, part of another company of the 2/7th Field Ambulance arrived from Salum: the remainder and the Headquarters Company were still stranded at Mersa Matruh. Le Souef, who had insisted on keeping up with his unit in spite of illness, had contrived to move on his equipment as far as Salum in borrowed vehicles, but was still unable to assemble the whole of his command. In spite of the rush caused by changed plans, things were easing off. The staffs of the Field Ambulances 2/1st, 2/2nd and the available company of the 2/7th had worked exceedingly hard, and had to be practically ordered off duty in relays. Ambulance drivers were found carrying stretchers when not driving. This was no light task, even at the main dressing station, where the degree of dispersion necessary to lessen the risk in air attacks increased distances greatly. A few of the dental officers had arrived forward, but even had the dental units been able to be there they would obviously have been without opportunity to do their own work, though they all carried out useful functions in times of stress.

Most of the casualties were coming from the southern sector, particularly from the 2/2nd and 2/5th Battalions, but the total numbers were moderate, though more Italian wounded needed treatment. These troops were attended by their own medical officers, and were held in the area temporarily until they could be sent to hospitals in Bardia. Casualties from the line were usually moved on stretchers on utility trucks. At night Captain R. H. Macdonald, R.M.O. of the 2/6th Battalion, treated casualties with difficulty in a lean-to at the side of a truck blacked-out with blankets.

The chaplains gave valuable assistance with such amenities as hot drinks for the tired men and the patients. The problems presented by the unexpectedly large numbers of prisoners of war were causing anxiety. The provisions made for them were most inadequate, but there was little that

the medical services could do at the moment. Prisoner patients were increasing uncomfortably; no doubt many of them actually wished the fall of Bardia would not long be delayed.

Up to 1830 hours on 4th January, 310 A.I.F. and 12 British wounded had come into the M.D.S. since the attack began. By the morning of the 5th the position was fairly well stabilised. Resistance was weakening, and though some active hostility was still shown in places the battle for Bardia was virtually over by midday, when the last Italian posts capitulated following a dawn attack by 2/4th, 2/8th and 2/11th Battalions.

A message was received by Disher that Major Arthur of the 2/2nd Field Regiment was in an Italian tented hospital outside Bardia, and that Italian medical officers wanted to amputate both legs. Disher immediately went there with Furnell, Smith and Salter. There they found Captain Refshauge, R.M.O. 2/2nd Australian Field Regiment "standing guard threatening dire things to the Italian medical officers if they touched him". Arthur's condition was good enough for him to be moved to the Australian main dressing station where later he was successfully operated on without any radical measures being necessary.

While in Bardia Disher made a reconnaissance and also met Colonel Wallace, A.D.M.S. of the British Armoured Division. On his return he found Colonel Smyth, who as usual was most helpful in discussing arrangements for the future. Practically all Australian casualties had been evacuated by that time and the chief problem then was the Italians. At Bardia were two Italian hospitals, one in huts, the other in tents. Part of one was taken over for Australian use, but it seemed as if both hospitals would be more use for the Italians, who could be thence moved by sea. Smyth hoped to have the long delayed 2/7th Field Ambulance brought up on the morrow to Salum where there would be a British field ambulance acting as a C.C.S. The plan devised at Middle East Headquarters of moving the 2/2nd Australian C.C.S. up to Salum never materialised. Actually at this time the unit was still *en route* to Amiriya, and shortly afterwards a surgical team was attached and held in readiness there.

The 2/1st and 2/2nd Field Ambulances now were to exchange roles. Instead of 2/2nd Field Ambulance going into Bardia as planned, the whole unit with "A" Company of 2/7th Field Ambulance would go on, leaving a company to run a staging post some twenty-five to thirty miles farther west, while the main body pushed towards Tobruk. The arrangement during the battle of Bardia had worked very well; all the field ambulances had pooled staff, equipment and transport, so that together they were "A.A.M.C. 6th Division" rather than separate units.

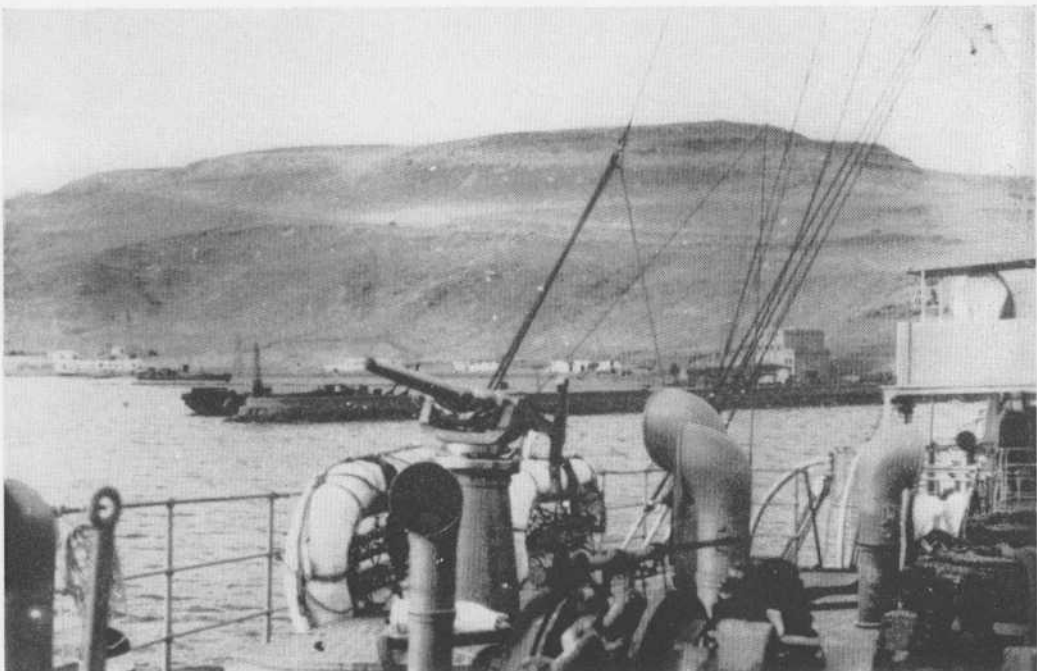
The 16th Brigade took over the Bardia area. Some needed medical equipment was collected from a dug-out hospital in the town. All ambulance companies and sections were recalled to the parent dressing station and regular visits were arranged to be made at all R.A.Ps. twice daily. Le Souef had at last managed to make his way forward; the H.Q. and "B" Companies of his ambulance were then attached to the staging post at Salum. He and his staff were naturally disappointed at being

excluded from playing the part they hoped at Bardia, but this was purely due to the inadequate number of vehicles available, in spite of the most earnest endeavours of Smyth to have the unit brought forward. However, Le Souef took immediate advantage of the fall of the town, for he sent back all available drivers to Bardia with empty M.A.C. cars and when they returned they were driving over twenty captured Italian vehicles. Thus was his transport problem solved for the moment. Colonel Cohen and Mr D. R. Tapper of the Australian Red Cross, who had not been able to reach so far forward a point before now, also arrived and gave welcome assistance.

On 7th January Disher left for the Tobruk area. Catching up with the main body of the 2/2nd Field Ambulance he arranged for it to form an M.D.S. at an area selected to serve the action against Tobruk. With them went the original surgical team of Julian Smith and Stephens. Cunningham was left in charge of medical arrangements at Bardia, where the 16th and 17th Brigades were still sited for a few days. On 8th January the main body of the 2/1st Field Ambulance moved on with the 16th Brigade Group, leaving Major Young with "B" Company to follow with the 17th Brigade the next day.

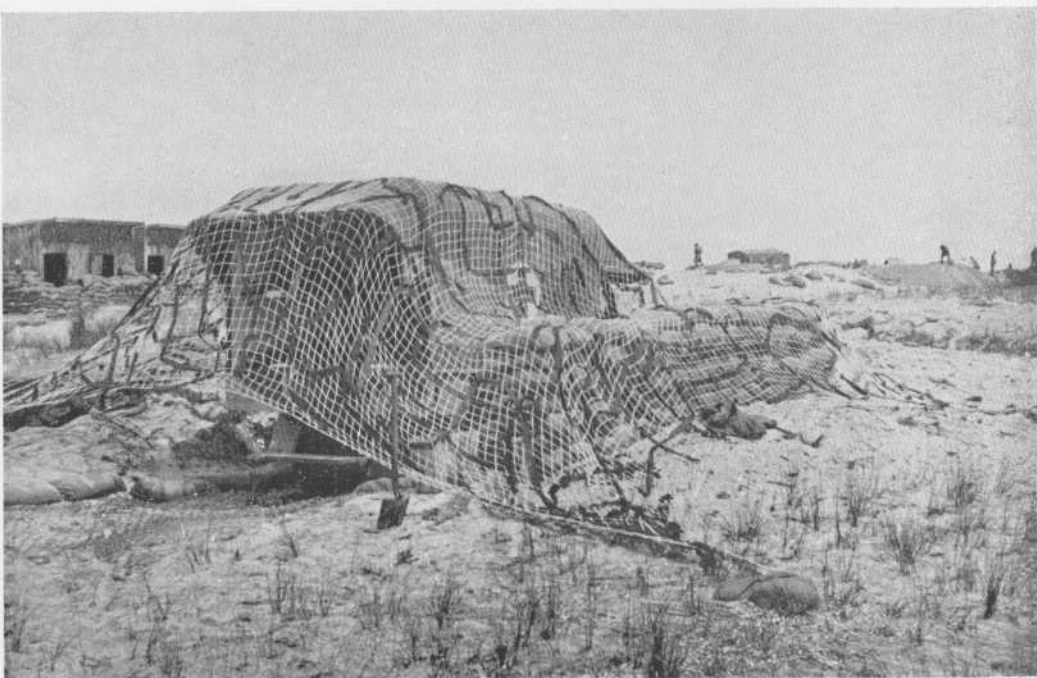
After the Australian brigades had left Bardia the 2/7th Field Ambulance and the 2/1st Field Hygiene Section were the only Australian medical units in the immediate area. Major Dawkins, who had been acting as a liaison officer for the A.D.M.S. of 6th Division, continued for the time being to act in this capacity, and Major Saxby was left with rear H.Q. as D.A.D.M.S. of the Capuzzo area. Smyth agreed that Le Souef's ambulance should be sent forward when able to move, and authority was obtained for this unit and the 2/2nd Field Ambulance to complete their establishments with Italian vehicles. As previously told, this permission had been anticipated at least in part. All the regimental medical officers before moving on were able to supplement their medical supplies with items of captured equipment; most of this was of excellent quality and design, and some of the items had been previously unobtainable. The aid posts were in fact now better equipped than for the action at Bardia: damaged R.A.P. trucks were in some instances replaced by Italian vehicles. In view of the distances to the supply depots behind and those still to be covered in front it was well that this source of supply could be tapped. The regimental officers could not have always dressed some of the wounded adequately without falling back on captured Italian material.

Within a few days the immediate needs of the Bardia and Capuzzo areas had been largely met so far as the Australian responsibilities were concerned, and the rear parties had moved on. During this time there were a number of important jobs to be done. The 2/1st Field Hygiene Section under Drummond surveyed the water situation. No evidence was found of poisoning of any source of water. All water points and wells were marked with a high white obelisk which indicated that the source had been cleaned, but not necessarily that there was a flow of water. The total daily ration was only half a gallon. The problems raised by the



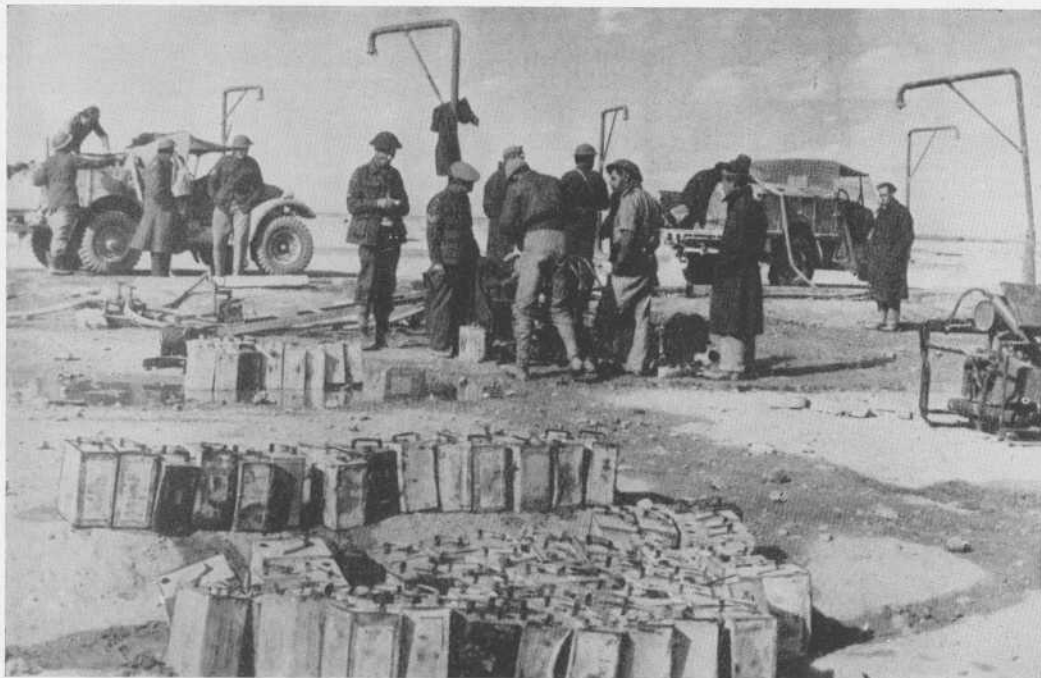
H.E.M.S. *Fawzia* in Salum Harbour.

(J. J. Gleeson)



Camouflaged motor ambulance, Mersa Matruh.

(G. B. G. Maitland)



(Australian War Memorial)

Water for advancing A.I.F. was drawn from this supply, January 1941.



(Australian War Memorial)

On the edge of a minefield, Western Desert; instructions to driver,
turn left at wrecked plane.

presence of thousands of Italian prisoners of war were still largely unsolved. Conditions had been chaotic while vast numbers of captives were pouring along the roads during the action at Bardia, and for several days after. Most of their medical needs could be met by their own services, but even when food, water and covering were assured hygiene was indeed a conundrum. However, there was little time for the attenuated remainder of the 6th Australian Division medical services to do much, as their work lay farther on.

Meanwhile, an additional fillip was given to the problems of hygiene by the presence of Major I. M. Mackerras, the pathologist of the 2/1st Australian General Hospital, whose special training and experience as a research entomologist fitted him admirably to investigate the local problems. Burston had dispatched him with independent transport to make a thorough investigation of flies and fly breeding in the Western Desert, with a view of applying measures to prevent outbreaks of diarrhoeal disease. As yet the weather, though warm during the day, was rather cool to favour much fly breeding, but there were plenty of hygienic problems. Mackerras was given a free hand in this work and was also very valuable in other ways.

SEA EVACUATION OF THE WOUNDED

The remaining Australian patients from Bardia were promptly sent back by sea from Salum. The main body of 2/7th Field Ambulance carried out this work and by 9th January was at last able to proceed forward in its recently acquired transport. The ship used for sea evacuation was H.E.M.S. *El Amira Fawzia* with Major J. H. Stubbe in charge of the medical arrangements. About 122 lying cases could be carried, half on the main deck, the others on other decks and in cabins. The ship's medical requirements came from varied sources. The Royal Navy supplied 98 mattresses and 800 blankets, and army ordnance 12 stretchers. Medical equipment came from the 2/5th A.G.H. which had arrived in Palestine a short time before, and comforts were obtained from British and Australian Red Cross and Australian Comforts Fund. It was thought prudent for the ship not to remain in Salum Harbour after dark. Despite difficulties caused by simultaneous carriage of prisoners and patients and by the negotiation of stretchers through hatches and other narrow parts of the ship, evacuations were promptly and efficiently made. The first patients were removed by this ship from Salum on 4th January: they were disembarked at Haifa and sent to British hospitals in Jerusalem. Sea transport gave the choice of Alexandria or Haifa as ports for disembarkation, the former was preferred from the Australian point of view, as it permitted quicker access to an Australian hospital.

At Mersa Matruh the 2/1st C.C.S. was established by 1st January and started receiving patients who then were arriving by motor ambulance after a journey of two to three days. Most of them were held for only a day. After rest and feeding they were usually fit to travel on and were sent to a British C.C.S. at Daba if likely to have only a brief illness;

otherwise they went to Alexandria or Cairo. The unit was under direct control of headquarters of British Troops in Egypt. On 7th January a surgical team comprising Major E. S. J. King and Captain N. H. Robinson arrived from the 2/2nd A.G.H. An operating theatre and transfusion room were equipped in well-protected basement rooms in the detached stone buildings occupied by the unit.

On 10th January a total of 354 battle casualties had been handled and all but eight were by that date evacuated. By this time patients were arriving by ship from Salum, and others were embarked for Alexandria and other base ports. Men of the Hampshire Regiment did the actual loading of the outgoing patients on 8th January with great care and efficiency. After the battle of Bardia this clearing station was able to hold patients who were likely to make a prompt recovery, and discharge them to transit camps for return to their units. This saved a great deal of time.

MOVEMENT TOWARDS TOBRUK

Meanwhile the 2/1st and 2/2nd Field Ambulances were moving up into the Tobruk area. There were not enough vehicles to move both units at the same time, so the pooled vehicles of both ambulances moved the 2/2nd Field Ambulance and then returned for the 2/1st. The terrain at Tobruk was very similar to the Bardia area. Here also there were escarpments running parallel to the coastline which was intersected by wadis cutting deeply into the rising ground for several miles. The weather now was not so cold. At Bardia the men had been glad of their leather jerkins and greatcoats; at Tobruk too, exposure to the cold windy nights made these desirable, but the men preferred to reduce the weight of clothing carried. Supplies of more clothing and underclothing were arriving for distribution. Many were appearing in Italian pattern boots, which suited the local country well; their own were in many cases worn out, and though replacements were on their way they were hard to get over the long supply line. Water was still scarce—the total ration was cut back to half a gallon a day, but advanced again to three-quarters of a gallon when another source was found at El Adem. This water shortage was in part responsible for another troublesome outbreak of “desert sores”, but otherwise the men were fit.

Off the main roads the tracks were extremely bad, full of pot holes from which rose smothering clouds of dust. The dust storms seemed to be worse than at Bardia, if this was possible. Detached mobile sections of field ambulances were used with advantage, and coming under brigade orders they could be moved in accordance with needs of troops without affecting the work of the remainder of the unit. Cunningham's field ambulance was serving the 16th Brigade, whose role, as in the first engagement, was the establishment of a bridge-head. No more casualties were expected here than at Bardia. Julian Smith's surgical team was now attached to the 2/2nd Ambulance, which served the 19th Brigade, but it seemed that it might perhaps be more needed with the 2/1st. The main body of the latter unit by 10th January had moved forward and Disher

at last had three field ambulances on the spot. There was still no real security about the transport question, for wear and tear were rapidly reducing the efficiency of the vehicles, and the ever increasing length of the lines of communication made it more and more difficult to look to the Army Service Corps for help. Spare parts were very scarce and broken springs common.

Enemy air action increased the risks of damage to vehicles, and, although not many men were directly injured in raids, they were endangered by the numbers of "thermos" bombs scattered on the desert. Wide dispersion of posts was necessary, and the constant movement of units and deterioration of the roads through heavy traffic increased the strain. These conditions also reflected on hygiene. Standard methods of sanitation were impracticable in most cases, the problem became less communal and more individual, and every hygienist knows how unreliable is the individual conscience. This was evident in the shallow trench method which was the only practicable one in some areas where the ground was stony. Pioneers were making petrol tin latrines, which were a great improvement. In the front line men were living uncomfortably in dug-outs. Booby traps added to their perils in movements near the defence perimeter. By 12th January the Australian forces were more stabilised in their areas and the three field ambulances were closely concentrated. The 2/2nd Field Ambulance was able to bring one of its companies up from a staging post at the junction of the roads to Tobruk and Capuzzo, and their duty was taken over by a company of the 2/7th Field Ambulance. This post was housed in a building at Gambut and friendly cooperation between the two Australian Services was here a pleasant feature, as an R.A.A.F. squadron stationed in this building allowed the army unit to use one of their rooms for resuscitation work. There being a water point here, Melbourne inhabitants will see why it was called "Young and Jackson's". The remainder of Le Souef's ambulance was used as a divisional reserve, and for the time being ran a divisional rest station which was opened on 15th January near the coast and was designed to hold patients only needing some rest and care for 48-72 hours.

Furnell's ambulance sent an advance party on towards Tobruk and the rest of the unit collected at an area in a wadi on the seaward side of the main road near the junction of the roads to Tobruk and Capuzzo.

Battalions on each side of the road were cleared by mobile sections. In one of these areas movements were made with difficulty, as they attracted shell-fire. By 12th January the M.A.C. had completed its necessary work in Bardia area and was able to come up and thus relieve the strain on motor ambulances. Parcels and supplies from Red Cross and Comforts Fund began to arrive; this was a great help, for there were no canteens.

PREPARATIONS FOR THE ATTACK ON TOBRUK

Within the next week from 13th to 20th January the division continued its preparations for an attack on Tobruk. Artillery was brought up, and

there was a switching of the brigades, the 19th moving up behind the 16th and the 17th coming up on the right. The plan was for the 16th Brigade to make a gap in the defences following diversionary moves of the British Armoured Division, and the 19th Brigade, with artillery and a cavalry squadron, was then to enter for the final blow, while the 17th Brigade dealt with the eastern sector.

One A.D.S. of the 2/1st Field Ambulance was established to serve the left flank, and a company was held in reserve to move forward later. On the right flank an A.D.S. and a mobile section were established by the 2/2nd Field Ambulance, the remainder of the unit being held in reserve. The 2/1st Field Ambulance had agreed to take casualties from the armoured division if this force was on the same line of evacuation. The M.D.S. of the ambulance was moved farther north to the base of escarpment. Disher decided then to bring up the 2/7th Field Ambulance H.Q. alongside this M.D.S. to establish there a forward operating centre. Casualties could be received and sorted at the 2/1st M.D.S., and the more urgent passed to this centre, to which an operating team was attached. If the situation demanded that the M.D.S. should move on it could do so, leaving the 2/7th operating centre to hold patients for several days longer, and to act for the moving M.D.S. while the latter re-established itself. The bad road from the M.D.S. to the staging post at Gambut was a deciding factor in making this arrangement.

Colonel Vasey of the 6th Australian Division had planned a new road connecting the 2/1st and 2/2nd Ambulance dressing stations. This was now finished, and was supposed to be reserved solely for the use of ambulances. Disher and Saxby explored and marked an alternative route which might be useful, though marking roads with petrol tins was officially frowned upon as it attracted unwanted aerial attention. Even the good road from the 2/2nd M.D.S. back to Bardia was rapidly deteriorating with the traffic. It was obvious that the bad surface of the cross-country roads and the incredible dust would retard the movement of the wounded; therefore it was desirable to have additional surgical teams. Permission was sought and obtained from Colonel Smyth for more surgical teams as several were available. Besides Julian Smith's team, there was King's from the 2/2nd A.G.H. which had been helping and waiting at 2/1st C.C.S. at Mersa Matruh, and Ross's from 2/2nd C.C.S. at Amiriya. It was fully realised that the attachment of teams to main dressing stations of field ambulances carried with it a danger of immobilising the unit if many men were held after operation. At Bardia this had not raised any special difficulty, for the number of casualties was not large, and operations were limited to well defined emergencies. At Tobruk the line of evacuation was longer, and the hospitals at Bardia were still clogged with Italian sick and wounded. The lull between the engagements was fortunate, for it gave time for the situation to be adjusted.

In asking for more surgical teams Disher was aware that he could not ask a field ambulance to assume the role of a C.C.S. Nevertheless he was conscious of a difficulty emphasised by Julian Smith, who considered that

patients seriously ill had been evacuated too soon from Salum. Smyth, however, explained that tactical considerations had prevented men being held longer at Salum. King meanwhile had made a report on his experiences while with the 2/1st C.C.S. at Mersa Matruh. He was unfavourably impressed by the results of some of the surgical work done in forward areas, though he praised highly the work done by Smith's team. Both Smith and King agreed that all work of this kind, requiring rapid judgment and a high power of adaptation to difficult conditions, might be subject to criticism on occasion, but they felt that the results would be better if Australian wounded were handled by Australian teams. This implied some discrimination against British surgeons in the desert, but it must be remembered that the Australian desire to use their own surgeons was not only based on a long established principle, but on the knowledge that an ample number of these specialists were available, as yet unabsorbed in really active work, and that they were picked men of unusually high attainments. Disher discussed the matter with Smyth, and they readily reached agreement. Smyth was perturbed that there might be implied criticism of his officers' work, but he agreed that it was fair that Australian teams should handle their own men. Accordingly arrangements were made for Ross's team to come forward to the British Advanced C.C.S. at Bardia where facilities would be given. With teams at the 2/1st and 2/2nd Ambulances' M.D.S., there would now be available two in forward areas and one well up on the line of evacuation. The need for additional transfusion facilities was also felt, and Smyth agreed to send for Major I. J. Wood and his transfusion team.

Certain other details which required attention in view of previous experience were worked out with the ambulances. In order to avoid delay with the reception and sorting of patients arriving at an M.D.S., the cards and containers were assembled after the rush was over, as it was considered that however important it might be to keep records, treatment was even more important. Separate accommodation was arranged for the treatment of the seriously and the lightly wounded, with separate entrances and exits, and curious spectators were ruthlessly excluded. The need for autoclaves in field ambulances was already obvious, and one was obtained for Julian Smith's team from an Italian hospital. Amongst captured material there were quantities of tentage and tarpaulins. Le Souef sent a vehicle specially to Sidi Barrani, and obtained enough to supply each field ambulance with an Italian operating tent and ward tents.

The 2/1st M.D.S. had a holding capacity of 130; and held a reserve of over 100 stretchers and 1,000 blankets. Vehicles were allotted for picking up walking wounded, and guides were ready to help the M.A.C. cars to find their way. A number of vehicles on loan from the A.A.S.C. in addition to the field ambulance transport vehicles were again detailed as "prowlers" with the object of picking up stray casualties and walking wounded. Major Buttle of the British Transfusion Unit was now stationed at Bardia and Major Wood, A.A.M.C., was attached to the 2/1st Field Ambulance to take charge of the local resuscitation work. The extra

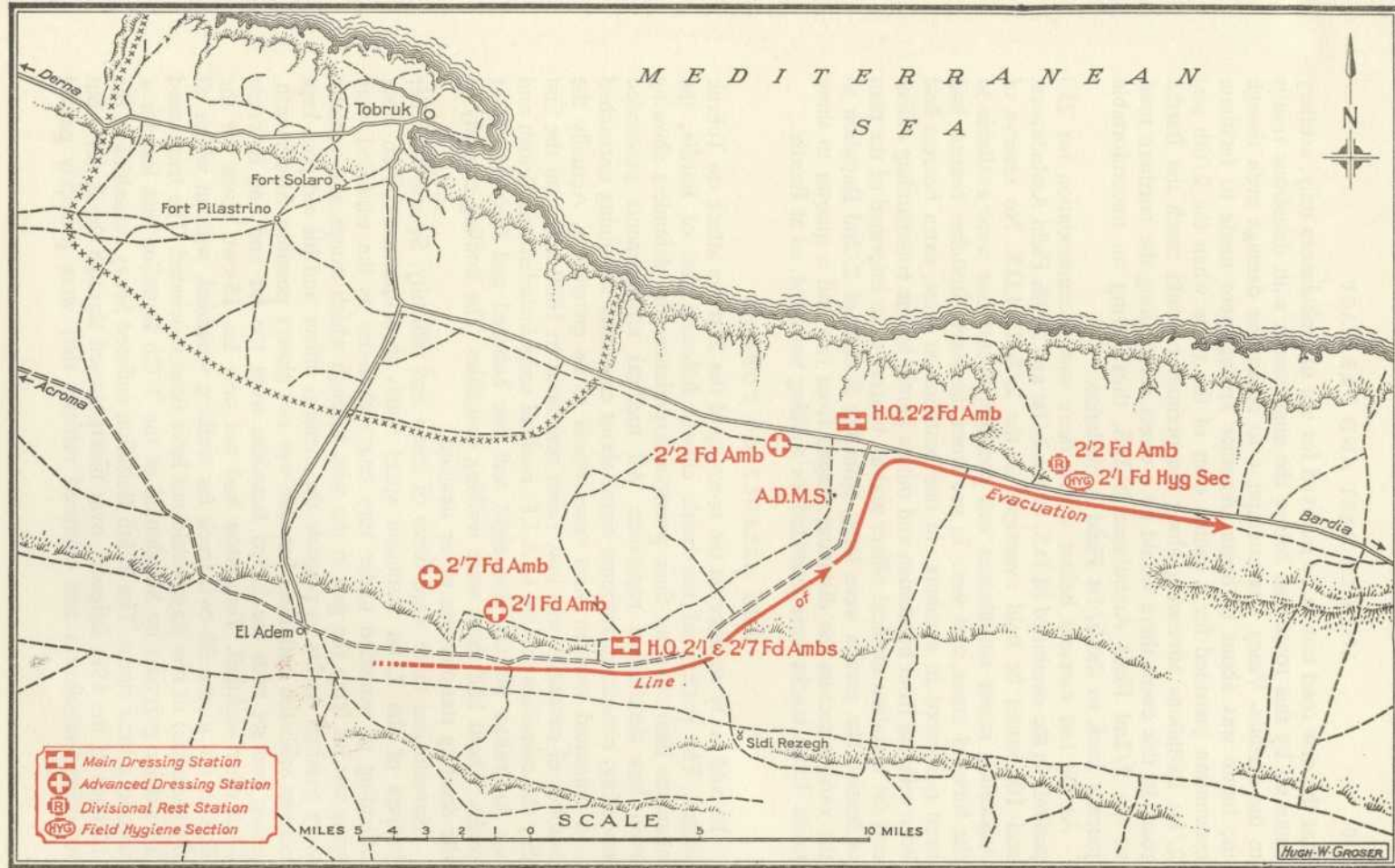
period of preparation and previous experience had borne fruit. There were still deficiencies to be found in plans and in equipment, but some chance had to be taken in the circumstances. Casualties in artillery units, for example, had been light during the battle for Bardia, and it was expected that the neighbouring aid posts and advanced dressing stations could render any necessary service to artillery units. With other detached units some degree of risk was unavoidable in their medical arrangements, as it was not really possible to hold an ambulance unit in reserve.

The 18th January dawned, if dawn it could be called, in clouds of dust blown by a raging gale. Disher on returning from the 2/2nd Field Ambulance had to use a compass to get bearings, while the car driver sounded the horn at intervals to guide him back to the car. Three days earlier it was thought that the dust could not have been worse, but now it broke all records with a dust storm which was said to be the worst within living memory. The H.Q. and "B" Companies of 2/7th Field Ambulance off the Capuzzo road found the tracks obliterated and went too far, almost running into the outer enemy defences.

MEDICAL ARRANGEMENTS

All practicable medical preparations had been made with the available men and material, and both British and Australian administrators had spared no efforts to have Australian medical units to hand to look after their own men. Arrangements were made by Colonel Smyth of British XIII Corps for the armoured division to evacuate patients for operation by motor ambulance convoy to the combined main dressing station; in less urgent cases the route would bypass this station and go straight to the main dressing station of the 2/2nd Field Ambulance. Farther eastward evacuation would take patients to the staging post at Gambut, which was now being called "Young and Jackson's" by the British also, and thence on to Bardia. This dispensed with an extra checking post originally planned on the main Bardia road near the 2/2nd Field Ambulance. This plan was convenient for the motor ambulance convoy, but appeared to have some drawbacks. There were already elements of possible confusion of function between the three field ambulances, but these were decisively settled by the clear understanding that, despite the adjacent siting of two M.D.Ss., the 2/7th M.D.S. was the field operating centre, and the acute surgery was to be done there. Non-urgent casualties brought to the 2/1st M.D.S. were to be treated as usual; urgent casualties were to be passed to the operating centre for immediate treatment.

In spite of the opinion expressed by engineers that the new road between 2/1st and 2/2nd Field Ambulances should not be marked for reasons of air security, marking was carried out before the assault on Tobruk began. It was well that this was done, for within one or two days before the planned day of battle, 21st January, ambulance cars were lost on this road through lack of marking. In fact the marking as first carried out by the 2/1st Field Ambulance had to be improved before the battle to ensure adequate guidance of vehicles. Despite the undertaking



Tobruk, 21st January 1941

that the new road was to be reserved for use of ambulances only, artillery came up by this route just before the engagement with disastrous results to the surface. Vasey was attempting to repair the damage even though the battle was about to begin. Another arrangement made to facilitate evacuation provided for a switch over of the route when the 2/6th and 2/1st Battalions advancing along the perimeter would reach the Bardia road. In this event there would be a direct route along the northern road to the 2/2nd Field Ambulance M.D.S. thus saving an uncomfortable journey back to the 2/1st Field Ambulance.

At the last moment before action there was accommodation for 230 patients in the combined M.D.S. of the 2/1st and 2/7th Field Ambulances, and 100 could be held overnight in the 2/2nd M.D.S. No reserve of Australian motor ambulances was possible; twenty-one were available in the forward areas, and were in use from the start. Stretcher bearers had been reinforced in numbers: in one battalion at least, extra bearers had been selected from bandsmen and others jointly by the commanding officer and the battalion medical officer and all bearers were informed of the plan of battle. The carries were long: from the R.A.P. of 2/2nd Battalion to the various sectors the distances ranged from two and a quarter to three miles. Extra trucks were provided for walking wounded, as at Bardia.

THE ASSAULT ON TOBRUK

In cold misty weather on the morning of the 21st the attack on Tobruk began. The pattern of the battle closely followed that of Bardia, the attackers heartened by their previous experience, the defenders showing even less determined resistance. All medical arrangements proceeded smoothly; occasional rumours heard about casualties remaining unreached and untreated were in most cases found to be groundless. Actually the number of casualties was low. From zero hour to 1800 hours on the first day the casualties treated in A.I.F. medical units included one British and six Australian officers, and eight and one hundred and forty-one other ranks. About half these were walking casualties. The holding capacity of the dressing stations was never strained.

Nevertheless there were times of stress and difficulty. Several stretcher bearers of the 2/1st Battalion spent about three-quarters of an hour attending to wounded under very heavy shell-fire as the wounded were lying not far from the gap in the wire through which troops and vehicles were passing. As far as possible the medical officer and his aid post kept contact with the battalion, but this was not always possible. Molesworth, losing contact with the 2/3rd Battalion went too far and had to come back after nightfall. Tomlinson had not only his 15-cwt. truck for the R.A.P. but also a 30-cwt. truck for walking wounded, without which all the casualties at one stage could not have been evacuated. The truck used for similar purposes by Macdonald of the 2/6th Battalion was lost for a time in a sand storm. The 2/8th Battalion suffered heavy casualties in the advance of the 19th Brigade: over ninety passed through the R.A.P., but by using ambulances and captured vehicles they were promptly passed

through to the A.D.S. and redressing of wounds was avoided. Most of the wounds were due to shells and during the initial break-through, booby traps.

When part of the 19th Brigade pushed on rapidly towards the coast, "B" Company of 2/7th Field Ambulance went forward with them but was unable to make contact for some time, which led to some misunderstanding and delay in evacuation from their A.D.S. though no harm was done, as resistance in this area was slight. By nightfall the 2/1st Field Ambulance was preparing to pack up to proceed forward, and sent its "B" Company up to the wire to provide an advanced dressing station should the 16th Brigade need it. Meanwhile at the operating centre work went on steadily. Casualties were arriving through both day and night. Three theatres were set up in all, including that of the 2/1st Field Ambulance. Fortunately good lighting was obtainable during this engagement and at Bardia from small motor-generator units. The work was done under the supervision of Major Smith as senior surgeon of the centre. This arrangement led to some doubt as to procedure whether the responsible surgeon of a team should decide what work was to be done, as the work was limited by the holding space of the unit, or whether the commander of the unit housing the team should decide. In practice no real difficulty was encountered. The wounded arrived without undue delay; where carries had been long and relief of pain was important, the value of an effective dose of morphine was apparent. The upper limit was usually about three-eighths grain. The transfusion arrangements under Major Wood and Major Mackerras were most satisfactory, using ice that had been brought up from Alexandria some days earlier. One-third of the men operated on needed blood, and at times six transfusions were proceeding simultaneously. The Italian operating tents used were about 12 feet by 8 feet with aluminium floor and celluloid windows that were reasonably dust proof. A smaller tent "brigaded" to the entrance made an effective dust trap and kept the theatre comfortably warm. It was arranged that the operating centre should remain for some days after the action ceased, so as to hold patients till they were ready to be moved. The casualties were successfully evacuated through the Australian holding post below the escarpment to the 15th British C.C.S. at Bardia, and farther on through Salum and the 2/1st Australian C.C.S. at Mersa Matruh. The surgical teams at the C.C.Ss. worked smoothly. At Bardia there might have been possibilities of misunderstanding and perhaps friction, with an Australian team attached to a British C.C.S. to do most of the surgical work, but amicable relations were established and maintained.

In the early hours of the morning of 22nd January Italian planes carried out a severe raid on the prisoners of war in a cage on the El Adem plateau, due, apparently to the lighting of fires by the prisoners to relieve the bitter cold. It was estimated that about 100 were killed and 280 wounded. All possible aid was at once sent to cope with the situation and to deal with the numerous casualties. During the afternoon 200 wounded were sent to 2/2nd Field Ambulance. Australian and several Italian medical officers

worked for hours in the cage, and all available motor ambulances were sent to assist and also to clear 150 wounded prisoners who had been held overnight in the Australian dressing station.

THE TAKING OF TOBRUK

The action against Tobruk was soon over. There were difficulties, and some temporary delays, and heavy going in places, such as the eastern sector, where the 17th Brigade had to negotiate deep wadis, but by midday on the second day, 22nd January, the battle was practically over. By 1800 hours the total number of A.I.F. casualties handled in medical units, excluding killed, was 11 officers and 196 other ranks. The units were able to cope with all demands. Occasionally there were rushes of work, as when a company of the 2/8th Battalion ran into a number of enemy tanks. The divisional rest station at 44-kilo was found useful helping in the prompt return of men to their units. "A" Company of 2/2nd Field Ambulance took it over when 2/7th Ambulance moved farther forward, and just before the action when only part of this company could be spared, Drummond of the field hygiene section relieved there, thus freeing Major Plowman who was on loan to the 2/2nd Field Ambulance from the 2/5th Field Ambulance for experience. The day after the action it was closed.

REVIEW OF MEDICAL ARRANGEMENTS

These two actions at Bardia and Tobruk are of great interest with regard to the medical aspects. Conditions at Tobruk were in some ways more difficult, for the distances were greater, the lines of communication longer and the vehicles, even if augmented since the days preceding Bardia, were beginning to show prematurely senile changes owing to the wear and tear of the work thrust upon them. On the other hand, more units were available, experience was greater and above all there was time for deliberate organisation. The operating centre proved a great success, enabling more seriously ill men to be held without hindrance to onward movement, but it was realised that it could probably only succeed in relation to a set battle or prolonged siege or assault. The problem was still posed; how to avoid long journeys for wounded men both before and after surgical treatment and at the same time to maintain the essential quality of mobility. Clearly it was seen that one possible answer lay in air transport of the sick and wounded, but as yet this ideal had not been attained in this campaign. The urgent need for air ambulances or transport planes was specially stressed by Brigadier Burston both to the Minister for the Army, Mr Spender, and General Sturdee, Chief of the General Staff, who were then visiting the Middle East.

The medical plans for these actions would have been altered considerably had one suggested scheme materialised. At the conference held at Middle East Headquarters at Cairo before the action of Bardia, tentative arrangements were made for the use of the British hospital ship *Dorset-*

shire as an advanced operating centre. For this purpose two complete surgical teams were despatched from an Australian general hospital at Kantara to British hospitals in Cairo to await embarkation, but the arrangements fell through and the ship was not used for this purpose. *Dorsetshire* acted as a hospital ship in the usual way, and carried patients back from Salum. The *Fawzia* had made regular runs from Alexandria to Mersa Matruh, Salum and back to Alexandria, and was found most useful. In the twelve days preceding 14th January five trips were made. Troops were carried forward, and the prisoners and wounded, including many on stretchers, taken back to the base. The total Australian infantry casualties from the battle of Tobruk from 17th to 22nd January were only 18 officers and 221 other ranks.

The Australian medical arrangements at Bardia and Tobruk have been considered in some detail. It is true that the numbers of the A.A.M.C. involved were small; indeed they would have been insufficient had more casualties occurred, but these engagements were important in Australian history. In this first serious trial of the medical services in action the difficulties were considerable. The terrain and climate were unfavourable; not even the veterans had experienced the like. Neither equipment nor training was complete in all the units involved, but there can be no doubt of the success of the field medical arrangements. The R.M.Os. showed ability and resource in coping with the varied situations, and all the field ambulances did good work. The presence of experienced surgeons with small trained teams proved most valuable and set a high standard. The budding of mobile sections from companies worked most successfully. Even though a touch of medical cynicism inspired a half serious description of sections of field ambulances as the "playthings of brigadiers", there was virtue in brigade control of these small sections under highly fluid conditions. They really provided additional small medical units for specific purposes, and, contrary to the view of some of the doctrinaires, their formation did not ruin the rest of the company.

For the purpose of these actions the pooling of men, materials and transport of medical units in the field had proved most successful. Even if the integrity of a unit was violated at times, the "leap-frogging" of units or their components was made easier and the slender resources were used to the best advantage. Close touch was maintained with all medical officers throughout these actions in which communications were usually difficult, and the personal contact of the A.D.M.S. and his two assistants did much to unify the work.

Certain features of the arrangements were unorthodox. For instance one advanced dressing station and one mobile section were actually sited so that patients passed these points on their way from the main dressing stations to the C.C.S. in the Bardia area. At the Gambut staging post there were facilities for resuscitation and administration of plasma. These might seem to be technical redundancies; fortunately the extra strain which they were designed to meet did not occur.

THE TREATMENT OF THE WOUNDED

Even more important than the mechanism of organisation of the medical services was the result to the wounded men. How did they fare after being wounded in the dusty desert, perhaps operated on in a forward area and then taken back over a long and often uncomfortable line of evacuation? It has been pointed out that early criticism showed that improvements were possible. In January Lieut-Colonel L. C. E. Lindon, in charge of the surgical division of the 2/2nd Australian General Hospital, reported on 134 casualties received at Kantara, after the battle of Bardia. He stated that the average time between wounding and the first entry in the field medical card was twelve hours, and that necessary surgery was carried out by an advanced surgical team during the ensuing twelve hours. The former figure was a generalisation which did not represent the true picture. As Disher pointed out, the battle began about half past five in the morning, and the first wounded began to arrive in main dressing stations about 10 or 11 o'clock, having already been seen in aid posts and advanced dressing stations. The actual time was in most cases three to four hours. Of course, sometimes delays occurred owing to failure to locate wounded men, especially at night, and men were at times held at advanced posts for resuscitation before being sent back. Lindon reported that even after four to five days' journey the men on the whole were fit. Progressive infection was found in only 6.7 per cent. This good result, as King pointed out in a report of work with the 2/1st C.C.S., was due as much to the low infective capacity of the desert dust as to prompt surgery or the routine use of sulphanilamide. Wounds seen in Italian prisoners who only came under observation several days afterwards, with no treatment other than first field dressing showed a similar freedom from infection. Nevertheless surgeons were convinced of the value of sulphonamide drugs, which were administered to all wounded and also used in open wounds.

In these early casualties difficulties were noted in maintaining adequate extension of fractures especially of the lower limbs. Plaster was found more effective where long journeys faced the patient, and fixed extension, especially if applied over the boot, often caused pressure sores, and much more discomfort and pain in travelling over the rough roads than when plaster was used. At the 2/1st C.C.S. the low proportion of wounds of head, thorax and abdomen was noted. Most of the wounds affecting the head were superficial. Through and through bullet wounds gave little trouble as a rule. Most lacerated wounds, if well excised at the forward centres, needed little further attention. In the few instances when primary suture and packing of wounds were essayed the results were unsatisfactory, as might be expected.

It is of course recognised that under the most ideal conditions it is impossible for men with some types of serious injury to travel in comfort, but measures were taken to apply such improvements as were possible, including better immobilisation and adequate use of sedatives and analgesic drugs. Disturbing rumours of men lacking attention were current as usual,

but these were almost always untrue. For example, it was alleged that twenty-four A.I.F. patients were in Italian hospitals in Tobruk, but thorough search showed that one Australian had already recovered and one had died in hospital: no others were found. Colonel J. Steigrad of the 2/1st A.G.H. was specially detailed on 12th January by D.M.S. A.I.F. to make an inspection of all A.I.F. soldiers in British hospitals in Egypt and reported very favourably on their comfort and progress.

On 25th January the forward operating centre of the 2/7th Field Ambulance was finally cleared, and its staff was ready to move on. Four patients were unable to travel except by ambulance and were brought on to Tobruk by Major Wood. At nightfall the party had lost its way and had to spend the night on the escarpment. The patients were given hot drinks and kept warm and cheerful and none were the worse for this ordeal. One of the men was seriously ill and had a Rehfuß tube in use for stomach drainage, but the tube stayed *in situ* and was still working successfully when the party reached Tobruk next day. Major Ross's team was settled with the 2/1st Field Ambulance in Tobruk. The other two surgical teams were now virtually unoccupied at Bardia and they too were ready to go forward. While the reorganisation of local hygiene was proceeding, and plans being made for future dispositions the first suggestion of a shadow presaging coming events appeared. News was received of the presence of German dive-bombers in Libya. But there was no doubt that the advance would continue, despite the ever-lengthening lines of communication.

CONDITIONS AT TOBRUK

Tobruk after its capture presented difficult problems. It was most important as a harbour and key fortress area, but it was then in a most insanitary condition. Before all those responsible for making Tobruk a more or less settled area lay work which surpassed that done in Salum and Bardia.

The numbers of prisoners of war handled at Bardia had exceeded all expectations, but even after this experience the arrangements at Tobruk were quite inadequate to cope with the thousands of prisoners crowded together, heedless of hygiene. At Bardia there were no buildings in the area wired off for prisoners, which was like all the surrounding country, incredibly dusty. At one time when up to 20,000 prisoners were being held there was definite overcrowding. Little water was available, only two quarts per man per day, supplied after super-chlorination from water points by trucks. Diets consisted chiefly of meat and biscuits, with extra for workers. At least 15,000 tins needed disposal daily. Lorries constantly collected rubbish: even the installation of incinerators failed to deal with all of it. Even when deep trench latrines were dug great numbers of prisoners would not use them, and persisted in soiling the periphery of the compound, in spite of the vigilance of inspectors with constantly circulating patrols. Conditions at Tobruk were if possible worse, where there were 20,000 men in one enclosure less than half a mile by a quarter of a mile in extent. There was a striking contrast between the excellence

of some of the captured hygiene equipment and the personal hygiene of the prisoners. For instance, Italian mobile bath units were very good in design, consisting of showers rigged at each side of 3-ton trucks with metal duck boards on the ground below. With these 100 men could be showered with 125 gallons of water, but such amenities were not much help to the crowded thousands of prisoners immured in the main cage at Tobruk. No doubt the unfortunate bombing of the captives by their own aircraft made them less responsive to the needs of themselves and their fellows. They were, in the words of an eye-witness, Major Ian Campbell, "a panic-stricken rabble". But in the early stages they undoubtedly suffered privations: they lacked cover from the cold, and it needed all the efforts of the guards to ensure that water and rations were properly and promptly distributed. Immediately after the action several hundred men collapsed from exhaustion, and no doubt also dehydration. An Italian medical officer worked hard to restore these men. Perhaps such sights reduced lower still the already depressed spirits of the captives. When concrete tubs were installed they rushed these and had to be strictly controlled by armed guards. The filth in places was indescribable at this stage, and only drastic and appropriate punishment for offences against sanitary decency made an attempt at proper hygiene possible. Medical services could do little with their own resources, though the hygiene sections laboured at directing the colossal task.

It was the energy and devotion of the Australian soldiers posted to this unenviable duty immediately after the battles of Bardia and Tobruk that enabled reasonable conditions to emerge from the dust and dirt of the compounds. The disposition of over 40,000 prisoners at Bardia and over 20,000 at Tobruk was a task of the first magnitude and of course could not be done quickly. It was evident that medical activities would centre upon Tobruk from which the victorious forces were pressing on towards Derna, and Saxby and his assistants had plenty of work facing them in their task of making the town medically safe for living and working.

CHAPTER 8

ADVANCE TO BENGHAZI

AFTER the swift fall of Tobruk a rapid move against Derna and Mechili was begun with the dual object of taking these places and rounding up remaining Italian troops in Cyrenaica. In Tobruk there was much to be done; in addition to the colossal problems of feeding, hygiene and transport of so many Italian prisoners, there was the task of making the town fit for use as a harbour of strategic importance. The possession of Tobruk by the attackers would simplify problems of transportation, for most of the vehicles of the force were now decrepit, and a sea base would assist greatly in the dash westward to Derna and beyond. The medical arrangements had to allow for the service of the Tobruk area itself, for the provision of a forward base for casualties of the engagements pending, and for the field requirements of the force pursuing the Italians.

FROM TOBRUK TO DERNA

The 16th Brigade of the 6th Australian Division was left temporarily in Tobruk, and on 25th January Major Saxby was appointed as A.D.M.S. of the town area and Major Dawkins took his place as D.A.D.M.S. of the 6th Division. For the present we must leave the internal economy of Tobruk area, and see what other dispositions of the Australian medical services were necessary. Colonel Disher explored the town's medical possibilities and during the 25th and 26th January examined the whole position in consultation with Colonel Smyth, D.D.M.S., XIII Corps. He also took the opportunity of reviewing the events of the last few days with the staffs of the field units so that the lessons of the action might be clearly realised by all who participated.

The main dressing station of the 2/1st Ambulance moved into a suitable building in the main street of the town, with "B" Company of the 2/7th Ambulance attached. Smyth agreed that the first Australian surgical team should go to this M.D.S., and that patients could be sent there from the rest station which had been set up by the remainder of the 2/7th Field Ambulance to serve the 17th Brigade area.

No moves of medical units were put into effect immediately after the Tobruk action, but motor ambulances were distributed among convoys to go forward, and warnings of possible movements were given. It was apparent that events in forward areas might call for rapid adjustment of the available field medical units. The 2/2nd Field Ambulance after satisfying some urgent requirements from the excellent Italian equipment in Tobruk, was ready to move on towards Derna and with "A" Company of the 2/7th Ambulance left in a strangely varied collection of vehicles. On 25th January Furnell set up an M.D.S. twenty miles from Derna. The headquarters of the 2/7th Field Ambulance was then in tents along the main road to the west, leaving the operating team with the 2/1st M.D.S. in Tobruk.

The field operating centre which had performed the surgical work for the forward areas during the assault on Tobruk was of course now no longer forward in location. It had fulfilled a final function in holding patients not able to travel, and now somewhat attenuated, held only eight patients. These men were moved by motor ambulance on 25th January so as to allow the rear party of the 2/7th Field Ambulance to rejoin the headquarters of the parent unit. Dental officers and staff attached to field ambulances were sent back to the divisional rest area for the time being, where they were able to do valuable work.

A building was also chosen in Tobruk as suitable for a casualty clearing station, and later for a hospital; there was accommodation here for nurses. During the temporary lull in the Bardia-Tobruk area, arrangements were made to evacuate Italians from the hospitals, and send them by road to Bardia, if able to travel. Others waited the arrival of ships in Tobruk. It was now possible for sick and wounded from the British armoured division, as well as Australian casualties, to pass back through the Australian units.

Meanwhile British and Australian forces had advanced on Derna seventy-five miles westward from Tobruk, while most of the British went to Mechili. The Italians had a strong force of defenders round the pleasant seaside town of Derna, which lies on a flat area at the foot of the steep escarpment. Access to the town from both east and west was by a steep winding road. On the eastern side the hairpin bends rivalled or surpassed the "Seven Sisters" well-known to travellers to Jerusalem. A difficult feature of the topography was the presence of unusually deep and precipitous ravines: of these the most formidable obstacle was the Wadi Derna, on the eastern side, regarded by the Italians as a natural defence. Thirty miles south-west of Derna the Italian armour defended the inland routes. The British armoured division, reduced considerably by the great strain of their vehicles and relying on reinforcements expected during February, advanced to meet the Italian force at Mechili. To the 6th Division was assigned the task of taking Derna: the 16th Brigade had been left in Tobruk. The 19th Brigade proceeded towards Derna, and by midnight on the 25th January most of one company of the 2/4th Battalion had crossed the Wadi Derna, which did not prove so formidable an obstacle as the Italians had hoped, and had taken up positions on the far side with little enemy resistance. So far as the medical services were concerned, the whole position was tactically different from that in Bardia and Tobruk. Any stiff resistance in Mechili and Derna would necessitate the establishment of two main dressing stations thirty miles apart and the supply of field ambulances for two sectors. This would be difficult to carry out with transport as shaky as it was. With the vehicles available the field ambulances could only move men and material separately, and were thus forced to duplicate each move. Reinforcements were needed too; the 2/1st Field Ambulance was forty-one men short, and the 2/2nd Field Ambulance almost as many.

A different type of country lay ahead. The 2/2nd Field Ambulance occupied an open site twenty miles from Derna in hilly country intersected by gullies and dotted with trees. The risks of air raids called for dispersal of tents and provision of slit trenches. This was demonstrated by early experiences in the area. Lieut-Colonel Furnell was able to save the life of one man by digital pressure of the brachial artery while sheltering him in a slit trench and then getting him to a dressing station. In spite of these hostile demonstrations the Italians did not seem likely to put up a strong resistance, and the attacking forces were on a tide of victory. As the onward movement was expected to be quick, the British and Australian troops would be medically served by mobile sections of field ambulances, which had proved their worth, and by their use would also ease some of the strain on transport.

When Disher moved up with the divisional headquarters on 27th January to the Derna area he found the 2/1st Field Ambulance staging post, about twenty miles on from Tobruk, in working order; in the same area a British surgical team was established. A little over twenty miles from Derna was the M.D.S. of the 2/2nd Field Ambulance with "B" Company of the 2/7th Ambulance still attached, well dispersed in open country. In front of them were three mobile sections each with a battalion. Here no definite advanced dressing station was established, for in this country the mobile sections were regarded of greater value than the conventional and relatively less mobile parent units. The vehicles of the 2/2nd Field Ambulance were found to be very lame indeed, as were those of many units: drivers accepted towing and being towed with resignation.

It was now found that the position ahead was still uncertain, though rumours were current that the Italians had evacuated Mechili. Smyth could not state plans more accurately at this stage, but agreed that it was wise to bring up two surgical teams to Tmimi staging post, in the region of the little coastal town of Bomba. This post was the junction for clearing the Derna and Mechili areas. Accordingly Major Smith's Australian team and a British team were brought up, the latter to clear the British armoured division. The weather was very bad again, with wind of gale force and clouds of dust. But in spite of uncomfortable conditions, and uncertainty about the exact position there were some indications that no stiff engagement lay ahead. Notwithstanding this hope, no chances were taken. Some of the areas around Derna were very difficult. Both the 17th and 19th Brigade areas presented problems in the rendering of medical services. In the deep wadis, particularly Wadi Derna, precipitous slopes could be escaped only by detours. Mines and booby traps were a hazard in spite of precautions, as for instance when Captain J. J. Ryan had to attend men in the open under shell and machine-gun fire after foremost troops had walked into a mine.

The news of the Italian escape from Mechili was confirmed. The 7th British Armoured Division had not succeeded in encircling the Italian armour, but this was no longer an obstacle to progress, as it was dispersed over the inland desert tracks leading westward. This altered the situation,

and the Headquarters Company of the 2/7th Field Ambulance, which had reached Ain el Gazala on 27th January, was now not needed at Mechili.

On 28th January the position continued to be indefinite, and the field medical units were still dispersed over considerable distances, though in the main converging on Derna. The headquarters of the 2/1st Field Ambulance was in Tobruk, but its other companies were moving up, one to relieve the company of 2/2nd Ambulance at the Tmimi staging post, the other to be attached to the 2/7th Ambulance. The headquarters and "A" Company of the 2/2nd Ambulance were still east of Derna, with mobile sections out with the 19th Brigade, and was being joined by its "B" Company on relief: "A" Company of the 2/7th Ambulance was still attached here while the main body of the unit was coming up to Derna. It will be seen that, although the sub-division and attachment of the components of these units might seem a complicated arrangement, it afforded means of caring for considerable numbers of casualties, should these occur at Derna, and yet a redistribution or recrystallisation could be made at any time to provide service for the force when it was free to move on westward after the disintegrating Italian forces. On the 29th the Tmimi staging post was set up with a surgical team attached, under Julian Smith, and a blood bank in charge of Lieutenant Harrington, R.A.M.C. Colonel Smyth arranged to have blood flown to the landing ground at Tmimi. The armoured division had an A.D.S. at Mechili, so all needs were covered.

THE ENTRY INTO DERNA

The position was changed on 30th January when a patrol of the 2/11th Battalion entered Derna without opposition. The main road into Derna had been destroyed in one place by the Italians, but engineers promised a speedy repair within twenty-four hours. The collapse of Derna meant that there would be onward movement, and that medical units could now be established in the town to act as a forward medical base. In the meantime the use of three rooms in a building near the aerodrome was obtained, and "B" Company of the 2/7th Ambulance moved forward to set up an A.D.S. The remainder of this unit was held there with the object of entering Derna as soon as possible. Three drivers and a mobile section were also sent on foot into Derna to make contact with the R.M.O. of the 2/11th Battalion, Captain Ryan, and to try to acquire vehicles that would serve as ambulances for the use of the dressing station being established in Derna. They could then evacuate the sick from the R.A.P. to the dressing station, drive the patients to the break in the road, and carry them by hand across the gap to a post on the other side whence they could be taken by ambulance to the 2/7th Field Ambulance advanced dressing station, and thence to the main station farther back. Casualties were not expected but arrangements were necessary, for injuries from land mines might be encountered at any time.

Now that safer use of good or fairly good roads was possible, a despatch rider was found very useful, working from the 2/2nd Field Ambulance,

though the ambulance convoy cars were also most helpful in taking messages. On 31st January the engineers, faithful to their promises, had the road to Derna open. The 2/7th Field Ambulance formed an M.D.S. there in an admirable Italian hospital building, which had been occupied by the detachment sent in advance. This building had 200 beds and room for 100 more, ideal for a hospital or C.C.S. There were other hospitals available in this attractive town, which was found rather dirty but was soon cleaned up. The Arabs not only defiled but looted Derna, and the fleeing Italians added to the confusion. Early action was necessary to prevent further looting. Le Souef's ambulance had the additional task of taking an inventory of the medical supplies available in Derna. These Italian supplies, left undisturbed after evacuation by the enemy, proved most helpful, and tided our services over many shortages. Exact locations of units were not easy to work out. The advance had been too rapid for the supply of maps to keep pace with it, and only a few captured Italian maps were available. There were no casualties though there were some extensive minefields. The divisional area extended from Tobruk to Derna and on 31st January the headquarters moved to Martuba, south of Derna. Medically it was covered by three field ambulances.

ADMINISTRATIVE CHANGES

During January important changes had been made in the general administration of the A.I.F. in the Middle East. Brigadier S. R. Burstons, as D.M.S., A.I.F. was responsible for A.I.F. medical administration as a whole; Colonel W. W. S. Johnston and Major W. P. MacCallum were appointed as D.D.M.S. and D.A.D.M.S. respectively of the I Australian Corps, and Colonel J. Steigrad became A.D.M.S. of the base area in Palestine. The Australian troops under corps control were widely dispersed, and included the 6th and 7th Divisions, and the newly formed 9th Division drawn partly from units just returned from England. On the 28th January the corps headquarters started for Ikingi Maryut, where it was to be located before moving to Cyrenaica to take command there.

On the 30th the 2/5th Australian Field Ambulance arrived in Tobruk, thus freeing the 2/1st Ambulance for forward movement. The 2/5th under command of Lieut-Colonel A. H. Green was attached to an advance party of the 18th Brigade of the 7th Australian Division. Two corps units were also being moved to Tobruk, the 2/2nd C.C.S. from Bardia, and the 2/3rd Field Hygiene Section which would then relieve the 2/1st Field Hygiene Section for work in forward areas. In a conference held at Cairo on 30th January between the British and Australian medical administrators the plan of bringing up an Australian hospital to Tobruk was also discussed, so as to allow the C.C.S. to move up into Cyrenaica at a later date.

CONDITIONS AT DERNA

Meanwhile medical affairs were being stabilised in Derna. Now that things were quieter there, the question of dental work was raised by

Colonel J. E. Down, A.D.M.S. Dental, who had just arrived. Even in these early days the problem of dental work in forward areas was seriously debated. On the one hand dental officers were valuable for emergency work with field ambulances. Australian dental officers had been appreciated not only by Australian but British troops, in spite of meagre supplies, for some dental material had been left behind at Sidi Haneish owing to lack of transport vehicles with other much regretted medical equipment and stores. Further, dental officers had proved most valuable during the stressful times in action in field ambulances and had assisted in theatres and given anaesthetics ably and over long periods. On the other hand it is admitted that only emergency dental work can be done during these times and meanwhile the much needed maintenance dental work, which can really be properly carried out only in areas where men can be spared and circumstances are more favourable, steadily accumulated.

The excellent facilities provided by the buildings in Derna and the ordnance and medical supplies collected for hospital use made the site a valuable one for a forward C.C.S., so the 2/7th Field Ambulance was deputed to act as such. Any augmentations of staff were to be made up from a British field ambulance or the 2/5th Australian Field Ambulance when these came up. This would allow patients evacuated from the division to recuperate for a day or two amid pleasant surroundings before passing on to the much barer tented hospital in Tobruk. Two surgical teams could be concentrated in the hospital building where there were two modern well fitted operating theatres. There was only one doubt, whether evacuation would be difficult over the secondary roads, especially from the 17th Brigade area on the inland flank, but on examination it seemed that even these roads were better than some recently used. The motor ambulance convoy would have no trouble in evacuating direct to Tobruk and patients able to be returned to their units would be sent to a base reception camp at Tobruk.

It had been found that rest camps or similar organisations were of great value in saving manpower even if established for a few days only. Once a soldier was on the "X list" through illness, and made the long trek to a hospital in the base area, a still longer trek awaited him and a considerable loss of time before he regained his unit. In this case, after discharge from hospital in Egypt he would go to the base depot in Palestine before he was redrafted. This moving of men over the chessboard, sometimes performing the "Knight's Gambit" as Colonel Butler pointed out in the 1914-1918 war, is one of the great difficulties in the relations of medical services with manpower. With a rapidly moving force, great distances, difficult country and meagre transport facilities, it is small wonder that such problems arise. R.A.M.C. personnel were better off in this respect, as it was competent for the D.D.M.S. of a corps to recommend up to fourteen days furlough without placing a man on the "X list". Australian medical administrators at times wished that they could do this with their own officers. The ruling at this time was that a soldier was placed on the

"X list" if admitted to a hospital but not if admitted to a camp reception station.

In order to save wear and tear on the ambulance cars up and down the long winding hill into Derna it was arranged that the 2/2nd Field Ambulance use their own transport to send patients only as far as the top of the escarpment where a relay from Derna would pick them up.

In the brief period before the next move took place, opportunity was taken to send a company of the 2/1st Field Ambulance to help establish the hospital at Derna. This help was welcome, but really another purpose was served, for it enabled more of the hard-worked ambulance men to enjoy such amenities as pleasant scenery and much wanted hot baths. Units closer to the sea had also not neglected opportunities of sea bathing. Care was specially necessary about drinking water, and the routines were checked with more than usual caution, as cases of typhoid fever had been detected among prisoners.

THE PURSUIT TO BENGHAZI

The immediate task of the attacking force was the pursuit of a rapidly retiring enemy. The 19th and 17th Brigades pressed on, leaving the 16th Brigade in the Tobruk area, still guarding prisoners and clearing and salvaging very considerable quantities of useful material. Visions of a pleasant sojourn in the neighbourhood of Derna vanished with the retreating enemy: the two brigades converged on Giovanni Berta on foot, the 17th coming up from the south. Touch was lost with the Italians, and when the tired infantry reached Giovanni Berta there were none to resist them either in this neat little town or in neighbouring settlements. On 2nd February arrangements were made for the brigades to go forward in vehicles, and the A.D.M.S. had to make his dispositions in accordance with the heightened movement. From the 31st January to 3rd February the 17th Brigade marched more than seventy miles over stony ground, and arrived with sore feet and tired bodies. Many of the men complained that the army issue socks were hard and hurt their feet; private supplies of home-made socks were shared with happier results. On 3rd February the M.D.S. of the 2/2nd Field Ambulance was sited south of Giovanni Berta, with a good road to Derna. During the night light rain fell and the gathering clouds promised more. The countryside was more fertile here; at first undulating with rocky outcrops, farther on it was more cultivated, with arable land and orchards with almond trees in blossom.

On the 4th, the 2/7th Field Ambulance moved on with the 19th Brigade, and hospital arrangements in Derna were taken over by a British field ambulance. On this date the British armoured division was south of Benghazi, after a rapid dash across the desert. From now onwards movement was almost incessant. All the ambulance convoy cars were needed west and south-west of Derna to keep up with the enemy's retreat, and special arrangements were made by Smyth for British ambulance convoy cars on the Derna-Tobruk run. The northern road from Derna ran through Cyrene to Barce; this had suffered severe damage, therefore the

alternative road was used, running inland through Slonta, Marawa and Tecnis. The almost continuous movement made it more than ever necessary to look ahead. Thus in establishing an A.D.S. of the 2/2nd Field Ambulance west of Giovanni Berta the site had to be considered as a possible M.D.S. for the future, and later as a staging post for rearward evacuations. Vehicles continued to show the stress of the campaign and breakdowns were frequent. The 2/7th Field Ambulance was now largely dependent on captured vehicles. These formed half the establishment of the 2/2nd Field Ambulance and the 2/1st Field Ambulance also had some.

An effort was now made to have the scattered rearward medical posts relieved from the eastern areas, so that they might concentrate the units stretched like elastic over many miles ahead. The 2/7th Ambulance during this phase had its elements scattered over a distance of more than a hundred miles. On 5th February the main body of the 2/2nd Field Ambulance moved some sixty miles to Slonta, and while the divisional headquarters moved from Slonta to Tecnis, the 19th Brigade went on to Barce. Fortunately there were very few casualties, those being chiefly due to injuries by mines. Furnell acquired some good equipment, including a good folding operating table and other supplies.

By this time the 19th Brigade was nearing Benghazi, and there was difficulty apparent in assembling even a composite field ambulance to service it. Advance British troops had now reached as far as El Agheila, far past Benghazi, and on the 6th a British and Australian party entered the town of Benghazi, whose surrender was formally taken next morning by Brigadier H. C. H. Robertson of the 19th Brigade. Rain was a more formidable obstacle to the oncoming 6th Division than the enemy at this stage, heavy downpours slowed progress and bogged vehicles. However, the main parties of the 2/2nd and 2/7th Field Ambulances managed to reach Tecnis and were pressing on. An unfortunate delay occurred here when Major M. A. Rees, O.C. "A" Company, 2/2nd Field Ambulance, who had been placed under orders of the 19th Brigade, was left stranded on the top of a pass waiting instructions. Disher took it upon himself to order them forward. With great toil this was accomplished throughout the night; practically every vehicle had to be manhandled out of a bog, only to be bogged again. It was reported that in some of the vehicles in difficulties radiators and even engines were exchanged during these trying weather conditions. Disher and Dawkins pressed on, and thus missed the worst of the rain and mud of this more fertile countryside, and after an uncomfortable journey reached El Abiar by nightfall. Here they found that the 19th Brigade was moving on past Benina, towards Ghemines, thirty miles south of Benghazi. The only medical care of the brigade was supplied by the R.M.Os. and a mobile section attached to each battalion, and Disher therefore suggested to senior divisional officers that they should try to make contact with any other ambulance parties which could strengthen the medical position.

Early next day, 7th February, Captain Dorney of the 2/2nd Field Ambulance reached Benina, and leaving most of his mobile section there without transport travelled right on to Ghemines, where Dawkins established a post with only a single battalion ahead. Captain H. C. Johnston's mobile section of the 2/2nd Field Ambulance was not far behind and was used to supplement a post organised by Dawkins in a school. The rest of the ambulance was still in the rear toiling through mud. The reinforcing medical parties thus arrived promptly to serve the 19th Brigade, though by this time the Italian forces had ceased to resist. There were no Australian casualties; only a few Italians needed attention. Had circumstances been different there might have been more serious cause for anxiety. Though the value of mobile sections had been again demonstrated in supporting a rapidly moving occupying force, the position became hazardous when the fast moving body of troops was anywhere up to fifty miles away from the main body of the field ambulance. Some possible drawbacks to the brigading of field ambulances were apparent, in particular the risk of the brigade losing contact. It was therefore desirable that the A.D.M.S. should keep informed of the movements of his ambulances.

By this time the 2/1st Field Ambulance was freed from its obligations in Tobruk and on 9th February, after delays with bad roads and the problem of obtaining enough petrol, "B" Company arrived at Barce and next day went on to Benghazi. Hither they had been preceded by the commander, Lieut-Colonel Cunningham, who was appointed senior medical officer of Benghazi. He chose the La Salle Hospital as a suitable site for an M.D.S. and arranged to open 200 beds. The first patients were admitted on 11th February and two surgical teams, one British and one Australian, were ready to begin work. The 2/7th Field Ambulance with two Australian surgical teams was established at Barce and began work in an Italian hospital two miles south of the town. The 2/2nd Field Ambulance, less one company, had a dressing station at Tocra and was working in Benghazi, though handicapped by the illness of two medical officers.

At this stage I Australian Corps came into the picture. On 13th February, corps headquarters had arrived from Egypt at El Abiar, and two days later took over the command from XIII British Corps. Colonel Smyth, who had been acting as D.D.M.S. XIII British Corps in which capacity he had been most cooperative and helpful to the Australian medical services, now became D.D.M.S. Cyrenaica Command (Cyrcom).

MEDICAL ARRANGEMENTS IN CYRENAICA

By now the 2/2nd Australian C.C.S. had reached Tobruk and was working in an Italian hospital. The hospital which the 2/7th Field Ambulance had established at Barce, was occupying a good stone building, so well adapted for the purpose that the 2/4th A.G.H. was being brought up there. It was further proposed that the 2/1st C.C.S. should come up to Benghazi; as an initial move the light section was brought up to work

with a surgical team. A corps rest station was formed to be worked by part of the 2/1st Field Ambulance at Tecnis. Some concern was felt about the safety of the hospital in Benghazi as the number and intensity of the air attacks were increasing. On the night of 13th February a large mine was dropped which wrecked numbers of houses and damaged one hospital and caused a number of casualties. Major-General Burston, D.M.S., A.I.F., was visiting the headquarters of Cyrenaica Force and the Australian Corps at this time: appropriately, he was promoted while in the forward areas. He advised Cunningham to complete the evacuation of the hospital, which was already being carried out, as quickly as possible. Cunningham remained in the building with a few of the staff in order to clear up all details personally, and on the night 15/16th February he and a medical orderly were killed in another air raid. His influence as the first Australian ambulance commander in this war was far-reaching and his loss was keenly felt. Captain F. D. Stephens was buried in rubble by the same explosion but fortunately was not seriously hurt.

The headquarters and "B" Company of the 2/1st Australian Field Ambulance then took over a completed civil hospital in another area of Benghazi from the 2/2nd Field Ambulance. It was necessary now to consider seriously the possible responsibilities involved in bombing raids, with regard to casualties, and the corps undertook this duty. There were some 3,500 to 4,000 troops in the town area, together with naval personnel. This number was expected to increase to 8,000, but did not include Australian troops, who were outside the town area. In addition there was the problem of the prisoner-of-war patients who became almost uncontrollable with fear during bombing raids. As many of the latter as were fit to leave hospital were transferred to the cage, after examination by Lieut-Colonel Salter, who had been appointed as S.M.O. Benghazi in place of Lieut-Colonel Cunningham. Salter had been given command of 2/2nd Field Ambulance, and Colonel Furnell was appointed as A.D.M.S. of the newly formed 9th Division, now mustering in Palestine and Egypt.

A discussion of all the medical arrangements took place between Major-General Burston, Colonel Smyth, Colonel Johnston, Major MacCallum and Colonel Disher. It was decided to clear the Italian prisoners from the Colonial Hospital at Benghazi as far as possible, freeing fifty beds for emergency and facilitating the performance of urgent surgery. Near Tocra one hundred beds were available in a camp reception station which serviced the 19th Brigade.

Just north of Benghazi at Coefia a forward operating centre was established by 2/2nd Field Ambulance. Here fifty patients could be held, but where possible they were sent on to Barce. On 18th February the light section of the 2/1st C.C.S. arrived at Benghazi: having no transport of its own proved a certain handicap, but it was a welcome addition to the medical resources of the division. The site of this centre was a pleasant one, and well camouflaged, quite suitable for a C.C.S., with good water supply, and solid buildings among trees and grass.

REORGANISATION OF MEDICAL SERVICES

Now that temporary stabilisation had been reached in Cyrenaica it seemed as if hospital arrangements could be satisfactorily made in spite of the long distance from the base. The maintenance of sea communication was of course important. This would simplify the question of supply and reinforcement of evacuation of sick and wounded. By bringing up part or whole of a casualty clearing station and a general hospital, the burden would be lifted from field ambulances of maintaining hospitals with an organisation meant for work of a different character. But the position could not be regarded as really stable, and adequate medical care of the forward combatant units was most necessary, not only to provide for the present dispositions but for any possible future actions. The complicated shuffling and interchanging of little blocks of field ambulances had been the only means of dealing with involved situations, but now a simplification of the methods was desirable. The staffs of field ambulances of the 6th Australian Division were scattered over 300 miles of country, with posts and detachments stationed at Derna, Slonta, Tecnis, Barce, Tocra, Benghazi and the areas still further forward. The 2/5th Field Ambulance under Lieut-Colonel A. H. Green had been brought up from Egypt three weeks earlier and had been helping in reorganisation of the local medical services. Some of its officers had been on detachment to 2/2nd Field Ambulance in Benghazi, and had profited greatly from the experience recently gained by the staff of that unit. Colonel Johnston now proposed to bring the 2/5th Ambulance to Derna, which would help the scattered units to concentrate their components to some extent. Besides, the medical units were now feeling one minor, but not unimportant strain, incident on a more static role, that of compiling returns. The formations interested in records of all sorts included not only division, corps and A.I.F. Headquarters M.E., but also the Cyrenaica Command.

It must be realised too that though war surgery is reduced to a minimum during quieter periods, the nature of surgical work changes. Surgeons in operating units are keen to take the opportunity to carry out non-urgent work so as to increase the efficiency of men whose disabilities need attention. It is questionable how far it is wise to extend this principle when far from a base. The surgical repair of hernia, haemorrhoids *et cetera* will throw an added burden on nursing orderlies and cannot well be done with meagre establishments. Another feature of the surgical work at this period was that, although battle casualties were few, they were often of serious nature, being due to injuries received in isolated thrusts by armoured vehicles in forward areas, or in bombing raids.

The position on 19th February was as follows. The 3rd British Light Field Ambulance ran an A.D.S. and M.D.S. in forward areas; Australian units maintained a medical inspection centre in Benghazi, a forward operating centre outside the town with surgical team attached, a camp receiving station in Tocra, a hospital in Barce, and staging posts in Tmimi and Slonta shortly moved to El Faidia. In addition a combined rest camp and convalescent depot was established at Tecnis for all troops

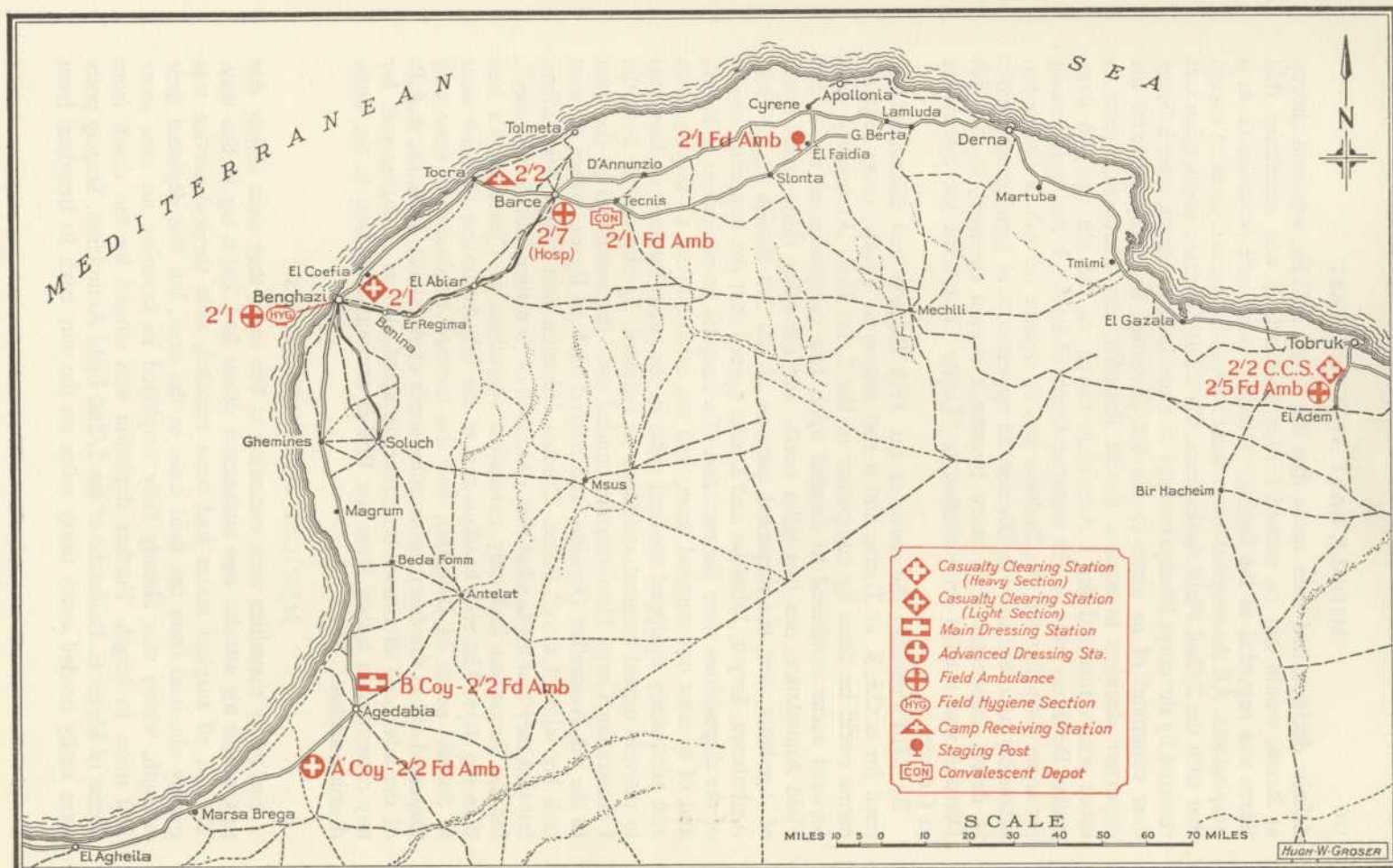
in the area. The 2/1st Field Hygiene Section was also working from the Benghazi centre and had the task of distributing men among the scattered units to help to raise the hygiene sense of the division. After the experiences of rapid movement in the desert the corporate and individual conscience in the lowly but necessary matters of hygiene and sanitation had relaxed vigilance. Even the divisional headquarters lines were found to be far from satisfactory. Flies could be expected any time now that the end of winter was approaching and Major Mackerras's survey had found a number of varieties which could act as vectors of dysentery and similar diseases. It was possible to revert to an improved type of sanitation in this area, and deep trench flyproof latrines were constructed which proved satisfactory. Water supplies were fairly adequate, but it was noticed that after prolonged use wells gave water of increasing saline content.

More help was asked for forward areas, and "B" Company of the 2/2nd Field Ambulance was detailed to proceed some 150 miles south of Benghazi. This thinned out the field ambulances still further, as there had not yet been time to bring up the 2/4th A.G.H. to Barce to free the 2/7th Field Ambulance, immobilised there with hospital numbers steadily creeping up. The dissipation of the forces over a wide area had a bad effect on unit transport also, for this period, like that of a ship in port, would normally have been a good opportunity for mechanical overhaul of the vehicles. As much as possible was done: at Barce a captured Italian recovery vehicle proved very useful and was being employed by 2/7th Field Ambulance to rehabilitate its own means of transport. Demands for dental treatment were coming in from all the units and dental officers were doing their best to supply it. Two were working at Barce at the hospital.

Since 20th February there were signs that the temporary lull was not likely to last long. Beds available were as follows: Benghazi 50, El Coefia 100 to 200, with a forward operating centre, Tobra 100, Barce 600 to 800, and Derna 250 to 300. Forward of Benghazi the needs were growing too, for air attacks were more frequent and heavy, vehicles, even individual vehicles, being the objective of dive-bombing and machine-gunning. South of Benghazi there was need for more staging posts for the distances were great. In this forward area from Benghazi to El Agheila the British armoured brigade was located, with Savige's 17th Australian Infantry Brigade. It was evident that the 3rd British Light Field Ambulance was very little to service these formations, even with the forward components of the 2/2nd Australian Field Ambulance. Lieut-Colonel H. C. Godding, A.D.M.S. of the armoured division, provided extra ambulance cars at the M.D.S. of the 2/2nd Ambulance and also at a staging post at Ghemines.

CORPS HEADQUARTERS RETURNS TO EGYPT

The 19th Brigade was withdrawn and the light section of the 2/1st C.C.S. was recalled to Egypt as part of a number of other changes. A



Cyrenaica, 21st February 1941.

definite decision had been made that the 2/4th A.G.H., expected shortly at Barce, would not be moved farther forward. It was significant that Barce was regarded as the farthest westward point safe or desirable as a hospital site. All the surgical teams were withdrawn from Cyrenaica except that with the 2/2nd Field Ambulance. On 22nd February notification was received by the corps headquarters of its move back to Egypt, after handing over command of its areas to the 6th Division. This resulted from the important decision to send a British Expeditionary Force to Greece, a move which involved the 1 Australian Corps, as the 6th and 7th Australian Divisions were on the tentative Order of Battle. It had been known for some time that the 9th Division was to replace the 6th in Cyrenaica, ostensibly to afford the 9th Division an opportunity of gaining experience in desert campaigning. A more important reason emerged, as the 6th Division was needed for inclusion in "Lustre" Force for the operations in Greece.

By 23rd February the move of the 19th Brigade had eliminated the need for a C.R.S. at Tocra, and a rest station at Tecnis; these requirements could be filled by companies of the 2/1st Field Ambulance. The forward areas continued to depend upon two companies of the 2/2nd Field Ambulance, one five miles north, and the other thirty miles south of Agedabia, and the dispersed sections of the 3rd British Light Field Ambulance. Smyth, Johnston and Disher agreed that the important points of the dispositions were the retention of a hospital or equivalent at Barce, and of at least one surgical team, and the establishment of staging posts and adequately equipped medical units in the areas forward of Benghazi to provide urgent surgical assistance as required. Finally on the 24th the 1 Australian Corps Headquarters handed over the command of the area to the 6th Australian Division, and moved back to Egypt, where its next task lay with "Lustre" Force. Colonel Johnston and Major MacCallum felt that they had made what they described as "a rather fruitless Odyssey", for the formation had only controlled operations in Cyrenaica for less than ten days. The rear headquarters of the 6th Australian Division went to Soluch, south of Benghazi, and the forward headquarters were well dispersed out in the desert some miles south of Agedabia. Here the R.A.P. of the advanced divisional headquarters acted also as a staging post for any casualties in transit from the British armoured division to the main dressing station.

MEDICAL READJUSTMENTS

Not many casualties were occurring at this time; they were chiefly due to German air attacks; one ambulance driver had lost a leg in this way. Though all surgical teams had been recalled, able surgical service was readily obtained from the field units in the area, but this depleted their strength, which was already fully employed in covering an area some 350 miles in length. Further depletion was caused by the death from illness of Major E. Bailhache of the 2/2nd Field Ambulance. Staging posts were really needed every thirty miles on the way back to Benghazi from

the forward area, but the problem was to supply them. A compromise was arrived at by moving the 3rd British Light Field Ambulance farther forward along the road from its original location, and equalising the spacing of other units concerned. The possession of fourteen ambulance cars by the British light field ambulance was a great help in evacuation. The Australian field ambulance staff appreciated the value of dispersal in this area, and found it advisable to leave 300 yards between bivouacs and parked vehicles. Colonel Smyth, D.D.M.S. Cyrcum, now left the command and Colonel Walker took his place.

The headquarters of the 6th Division moved on again and on 27th February was once more in desert seventeen miles south of Agedabia, dug in and dispersed in sandhills the surface of which was at least less unpleasant than the dust of the areas farther east. That evening word was received that troops including the 16th Brigade and one field ambulance were to return to Egypt by 4th March. As two ambulances were then immobilised as hospitals at Barce and Derna and the third was forward with the troops this was not possible unless relief was furnished. Salter, commanding the 2/2nd Field Ambulance, was worried over an order to return surplus Italian transport. As his forward mobile section was eighty-four miles from his headquarters, and as it was already difficult to carry rations and water, it was doubtful what could be termed surplus. Vehicles were likely to suffer in air raids too; the previous day the rear M.D.S. south of Ghemines had been subjected to air attack. The unofficial opinion of divisional medical services was that if the instruction was not officially received till the unit was relieved it might not be a matter to be deplored. At the moment it seemed likely that the forward troops would take up positions some thirty to forty miles farther on, which would then mean that the forward mobile section of the 2/2nd Field Ambulance would be over 120 miles away from its parent body. Such help as could be afforded by the acquisition of a small Italian motor ambulance by the R.M.O. of the 2/1st Field Regiment was gratefully accepted; in an artillery unit it was invaluable. The medical services of the 6th Division had to look after forces strung out for 350 miles, and this did not include the 16th Brigade in Tobruk which was being looked after by the 2/5th Field Ambulance.

THE 9TH DIVISION RELIEVES THE 6TH DIVISION

On 1st March the 2/1st Field Ambulance under the acting command of Major R. H. Russell began to collect its scattered companies and sections so as to join 16th Brigade at Tobruk preparatory to returning to form part of "Lustre" Force for Greece. These impending moves afforded good opportunity to exchange a few medical officers, with the object of adding to their experience in difficult types of work and grooming them for future work in ambulances or administration.

It was learnt two days later that relief of the 17th Brigade by the 20th Brigade of the 9th Division was to take place in a week's time. The staff running the medical post in the Colonial Hospital in Benghazi was being relieved by the British, and sufficient equipment was being left in the

Colonial Hospital to cope with civilian needs. Most of the admissions here, as in the military hospitals were for sickness and not for wounds. The details of relief of the various medical units were not easy to arrange from the distant base of Cairo, as it was hard to predict when relieving units would arrive. However, it was not likely that such problems, simple by comparison with past experiences, would worry the divisional medical services, even in an area so extended as Cyrenaica.

One interesting sidelight on the effect of uncertainty on morale was afforded by the increasing degree of strain or anxiety noticeable in men reporting sick to forward medical units. Knowledge that some units were returning, that changes were pending, and that enemy activity was increasing undoubtedly produced this uncertainty. On 7th March an advance party of the 2/4th A.G.H. arrived at Barce, and at least it was now known that the 2/7th Field Ambulance would soon be free to move back in accordance with the plan. The reason for the delay in the arrival of the 2/4th A.G.H. was remarkable—the unit had been shipwrecked.

A digression may be made at this point to explain what had happened in the fulfilment of the plan to send a general hospital to Cyrenaica. While Burston was visiting the Western Desert he was impressed with the need for an Australian hospital in the area at that time, and the recommendation of corps that a general hospital should be brought up was put into effect. Accordingly the 2/4th A.G.H., under command of Colonel N. L. Speirs, which had arrived from Australia a few weeks before, was moved from Amiriya to Alexandria and thence onward by sea. On 25th February the unit embarked on a small ship *Knight of Malta*. This ship, known locally as *La Ballerina*, struck bad weather at once, and impressed her passengers neither by the conditions on board nor by her performance in a heavy sea, but Captain English, in command, had no choice but follow orders. The O.C. troops, Major Sydenham-Clarke of the Queen's Royal Regiment, afterwards submitted a report on the conditions. Some 400 people were on board, but there were only 250 life-jackets, and an inadequate number of life-boats and rafts. Radio silence was strictly enforced and therefore no wireless operator was carried. The men passed a wretched night tossed to and fro in the holds, which were awash. Next day they were accommodated in other parts of the ship, and a meal was contrived in relays without cooking facilities and with only such utensils as were carried, plus a few dixies obtained by the embarkation officer. Sanitary accommodation was totally inadequate. Fortunately five nurses who should have accompanied the unit were not on board; apparently the movement control officer was unaware that the nurses were at Kantara and not in camp with the unit at Amiriya.

At 4 o'clock in the morning of 3rd March, the ship grounded on the only stretch of sandy beach in the vicinity. By then the weather had abated and it was clear moonlight. Major Clarke ordered the radio silence to be broken, using two R.A.F. operators on board. Lieut-Commander T. M. Hackett, R.N.R., who was in control of operations and landing, acted promptly with great coolness and resource. By 9.30 a.m. all men

were ashore and a few hours later the unit set out to march to Bardia fourteen miles across the desert. Help was soon available from Bardia; rations, baggage and equipment were salvaged successfully, and shifted by camels and donkeys some 600 yards across the sandhills over an extemporised road, using mattresses to cross a lagoon. An armed Polish guard gave valuable assistance in guarding the equipment. In a few days all the valuable equipment had been transported by waiting lorries to Tobruk, where the unit assembled by the 9th. The successful conclusion of this dangerous adventure of shipwreck was highly creditable to all concerned. Delayed, but not deterred, the 2/4th A.G.H. reached Derna on 10th March and arrived at Barce the next day, and on the 12th the unit took over the hospital from the 2/7th Field Ambulance. In hospital were then 350 patients, imposing a heavy task on the personnel of a field ambulance. To add to their trials, the septic tank system of the hospital building had overflowed. The hospital unit proceeded to unpack its salvaged equipment, but within ten days the staff were advised not to continue unpacking in view of a probable move back to Tobruk.

Meanwhile, units of the 9th Australian Division had arrived, and on 10th March Colonel Disher handed over to Colonel Furnell, who had been appointed A.D.M.S. of the incoming division. It was now possible to arrange reliefs and withdraw the various elements of the field medical units of the 6th Division so that they might assemble in Egypt preparatory to sailing for Greece. Indeed before all the units could be concentrated embarkation had already begun.

While on his way back from the desert Disher was able to discuss various aspects of the desert medical arrangements with others who had handled patients evacuated from forward areas. Steigrad's report on Australian patients in British hospitals in Egypt was also available, and Furnell had reported on the general comfort or otherwise of patients during evacuation. Certain elements of these reports concerned matters of administration in which difficulties occurred such as records, pay, welfare services and medical boarding. In the case of base hospital treatment, ideas and standards varied, but the general care of the patients was good. Conditions prevailing over the primary routes of evacuation were not always as satisfactory as could be wished. Furnell made some recommendations concerning comfort, in particular stressing the importance of adequate morphine dosage: it was of course clear that civil standards in comfortable hospitals cannot be attained where wounded are moved over long routes by rail and road. Good sea transport from Libya produced much higher standards of comfort for the patients. But considering the necessarily extemporised nature of many of the arrangements, the standard of work was good. It was fortunate, of course, that the casualty rate was low.

We must now leave the 6th Division and follow the fortunes of the 9th Division in Cyrenaica. At the end of February, the 20th and 26th Brigades were transferred from the 7th Division to the 9th Division in exchange for the 18th and 25th Brigades. The latter were fully equipped

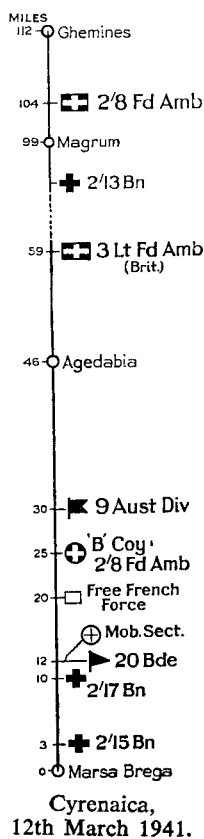
except for motor transport and were trained. It was planned to send the 20th Brigade forward while the 24th and 26th, which were deficient in equipment, trained in the Derna-Tobruk area.

THE 9TH DIVISION MEDICAL UNITS

It will be seen that the position was entirely altered at the beginning of March. The medical units of the 6th Division, which had learned in the hard school of experience during the past two months, were now to extend that experience under quite different conditions, while those of the 9th Division which replaced them in Cyrenaica were faced by a situation in which there were ominous features. By the middle of March it was known that strong German forces were not only in Tripolitania but further forward, and an attack appeared certain.

The 2/8th Field Ambulance under Lieut-Colonel B. S. Hanson, took over from the 2/2nd Field Ambulance in the area south of Ghemines. On 12th March there were further evidences of activity in this area: the advanced divisional headquarters was attacked from the air, and attacks were repeated when the site was moved. This ambulance was at this time the only Australian medical unit forward, but was sufficient to service the 20th Brigade, which was in the Marsa Brega area, and the 2/3rd Field Company R.A.E. The M.D.S. was situated on a bare rocky plain without protection; wide dispersion was necessary for safety, and the ambulance's tents were dug in, though the ground was a mixture of sand and stone, affording poor hold for tent pegs in strong wind. Operating and resuscitation centres were organised, and a dental surgery fitted up in a converted Italian ambulance. Advanced dressing stations, being in sandy desert, consisted of an "R.D." tent as the medical centre, with men dispersed in bivouacs.

It was recognised that great care was necessary in matters of hygiene, especially as the troops were relatively stationary. It was easy for ground to be fouled and the increasing number of flies and dungbeetles were a menace unless precautions were taken. The ambulance set-up provided for resuscitation and surgical treatment, though lighting facilities were not good. Two other field ambulances were expected, but neither was likely to arrive forward at once. The 2/3rd Field Ambulance under command of Lieut-Colonel M. L. D. McKeon was at Ain el Gazala on 19th March, and opened a camp hospital there to serve the 26th Brigade of the 9th Division, and was engaged in ambulance training. The 2/11th Field Ambulance under Lieut-Colonel T. A. Parry on 19th March was only just moving from Palestine to Egypt. It had been





The 2/4th Australian General Hospital, Tobruk.

(Lent by N. L. Speirs)



A ward of the 2/4th A.G.H. Tobruk, after a high level bombing attack. *(K. F. Russell)*



"Z" Ward, Tobruk. *(Lent by N. L. Speirs)*

thought that the 2/5th Field Ambulance, which had been some time at Tobruk, might come forward as the corps field ambulance, but altered plans cancelled this, and early in March, the unit was sent back to Egypt. The 2/4th A.G.H. was still working in Barce Hospital. The 2/4th Field Hygiene Section was at Gazala with the remainder of the division.

At the end of the third week in March British, Australian and New Zealand troops were assembling in Greece, the German tide was threatening to turn against the forces in Cyrenaica, and units of the 8th Australian Division had settled in and were training in Malaya. Berbera had been recaptured and British Somaliland was regained by British forces, and the detached episode of Giarabub had occurred. This small but interesting action in a desert oasis merits a brief digression.

THE GIARABUB INCIDENT

South from the coast of Salum runs the Egyptian border. About 160 miles from Salum and just on the western side of the frontier lies the oasis of Giarabub, and over seventy miles to the east is the larger oasis of Siwa. Both these fertile areas are in depressions which, like the large Qattara Depression still farther to the east, are below the level of the sea. Giarabub is historically important to the Senussi, who adhere to the teachings of Mohammed ben Ali el Senussi, whose tomb is in the local mosque. Its oasis is contained by rising mounds of sand, and to the north is overlooked by an escarpment. Siwa was defended by the British to forestall an Italian move and in November 1940 a squadron of 6th Australian Divisional Cavalry Regiment relieved the British infantry there. In the middle of December 1940, the greater part of this Australian unit went to Siwa and proceeded to patrol between Siwa and Giarabub and to harass the convoys to the latter. Once the British advance in the desert began, Giarabub was really in a state of siege.

Medical arrangements for the cavalry regiment provided a miniature R.A.P. with each squadron. Owing to the wide dispersal of the elements of a squadron it was essential for each to have its own transport, which evacuated casualties either to the R.A.P. or direct to the dressing station. Though radio communication was available, this was not possible during operations, and therefore the R.M.O. could not inform a field ambulance of his whereabouts. In fact the R.A.P. often carried out functions similar to those of a mobile section of a field ambulance. Owing to the necessity for being ready to move at very brief notice, it was even necessary sometimes for patients to be carried with the R.A.P. till further evacuation was possible.

Squadron ambulances were camouflaged and not marked with the red cross lest this should reveal the position of the squadron. From Siwa, air transport could be obtained if required, and on occasion the 200 mile journey to Mersa Matruh was thus covered in prompt and comfortable fashion. From Giarabub evacuation could be made by a 15-cwt. truck, or later by a four bed ambulance, seventy miles to Siwa where there was an Egyptian hospital. An R.A.M.C. medical officer was at the Siwa base,

and a corporal was stationed there also. There were some desert sores seen at first, but those gave little trouble later in spite of a curtailed water supply, 3 quarts per man per day for all purposes. This ration did not allow much washing of the person and none of clothes. The use of captured Italian blankets was forbidden owing to their occasional infestation by *pediculi*. Rations were good, care being taken to secure supplies of fresh Australian butter, and oranges when available, and the men were encouraged to eat raw onions. The weekly ration convoys were used to evacuate patients on occasion, but the R.M.O., Captain A. F. Janes, did not consider this desirable, particularly in the case of battle casualties. The road was bad and the ambulance waggons could not exceed 10 miles per hour. The health of the men was very good in this isolated spot, and by care and high morale a good standard of hygiene was maintained.

After the fall of Bardia, Brigadier Morshead, just arrived from England with the 18th Australian Infantry Brigade, made a reconnaissance and reported favourably on a plan to cut off supplies from Giarabub. Accordingly the siege was tightened, helped by a long range desert group of British and New Zealand troops. During 18-20th March a plan for the capture of Giarabub was put into effect, and carried out successfully by Brigadier Wootten on 21st March under difficult weather conditions. The Australian casualties in this engagement numbered less than 100, and the existing organisation had no difficulty in ensuring their preliminary treatment and return to the base. This action though small was of some tactical importance in its removal of an Italian threat on the flank. Medically the most significant and interesting part of the episode was the successful maintenance of a high standard of health and hygiene under conditions of monotony and isolation, owing largely to the work of Captain Janes.

CHAPTER 9

RETREAT FROM CYRENAICA

AFTER taking over the divisional medical command from Colonel Disher on 10th March, Colonel Furnell proceeded to Agedabia and found the advanced headquarters of the 9th Australian Division about to move to a safer location. There was considerable air activity; road convoys were suffering attack, and the forward headquarters site was bombed and machine-gunned both before and after the move. The only Australian medical unit in the area was Hanson's 2/8th Field Ambulance, but for the time being Furnell was acting also as A.D.M.S. of the 2nd British Armoured Division pending the arrival of Colonel Godding.

THE THREATENED GERMAN ATTACK

Though the other two field ambulances of the division, the 2/3rd and the 2/11th, had not arrived, the 2/1st Field Ambulance had begun to move back to Egypt on 4th March, and the 2/7th Field Ambulance by 12th March had handed over their hospital to the 2/4th A.G.H. at Barce and had reached Ain el Gazala. During the period of change over from the 6th Division to the 9th Division, that is, the first two weeks of March, no great difficulties arose, as for the most part medical commitments were light. Nevertheless the general situation was causing anxiety. The German air force had been attacking Benghazi since the British occupation, and towards the end of February the Royal Navy could not accept further risks in bringing in shipping to the harbour. Sea-borne traffic westward therefore ended at Tobruk, which had a serious effect on motor transport. The force covering Benghazi was 150 miles south of the town, and its vehicles were in poor mechanical condition. When the 9th Division arrived similar transport difficulties forced one brigade to remain in Tobruk, and no armoured reinforcements to the 2nd British Armoured Division were yet in sight. On 20th March the headquarters of the division was relatively well forward, seventeen and a half miles south of Agedabia, and the 20th Brigade was in the Marsa Brega area, in the neighbourhood of El Agheila. Neither the 24th nor 26th Brigade was then in Cyrenaica. The 2nd British Armoured Division was at El Agheila and was looked after medically by the 3rd British Light Field Ambulance, while the Australian brigade depended on the 2/8th Australian Field Ambulance. At that time this ambulance was not at full strength, as its "A" Company had not arrived. The main dressing station was working near Magrum, while the advanced dressing station of "B" Company was over seventy miles farther on. A mobile section from the M.D.S. was near the 20th Brigade headquarters, south of Agedabia; it was some ninety-three miles away from the M.D.S. All ordinary treatment could be given in the forward areas, and any emergency surgery performed; but for further hospital attention it was necessary to send patients by motor ambulance

convoy along the main road to Barce, where the 2/4th Australian General Hospital was established comfortably in barracks. As has been previously told, the 2/1st C.C.S. had been withdrawn to El Coefia near Benghazi, and on the same site the light section of the 15th British C.C.S. was now working, with its main body in Derna.

This state of affairs could not last long, as there were signs of coming pressure from the south. It was known that German armoured units were in Tripolitania, and that they were advancing around the Gulf of Sirte; it was evident that the forward British forces would have to withdraw. At a conference of the British High Command it was agreed that the 20th Australian Brigade would also have to move back, as with its incomplete transport and armament it would hamper the movements of the British armour.

MEDICAL ARRANGEMENTS

On 22nd March Furnell was informed that the 20th Brigade would move back, and with two battalions of the 26th Brigade now available would hold the escarpment from Regima to Barce and the road thence to the north. This withdrawal affected the 2/8th Field Ambulance also, but Colonel Walker D.D.M.S., Cyrcom, felt that the 3rd Light Field Ambulance alone would be insufficient if the Australian field ambulance withdrew at once from the area. Accordingly he had issued an order that the 2/8th Field Ambulance should remain temporarily where it was. This raised some difficulty, as the agreed principle of autonomy was concerned, whereby Australian troops were looked after by Australian medical units. This was pointed out by General Morshead, and on 23rd March Furnell discussed the matter with the D.D.M.S.: both agreed that "B" Company of the 2/8th Field Ambulance should provide a staging party at the M.D.S. site, while other moves were taking place. The light section of the 215th British C.C.S. moved south to an area north of Agedabia. On the 24th British patrols withdrew from El Agheila as the stronger German forces entered it. The 2/8th Ambulance withdrew to El Abiar and there it was joined by its "A" Company, and left behind three motor ambulances on loan to the British light field ambulance to work back to the staging post.

Meanwhile the 2/3rd Field Ambulance had arrived at Ain el Gazala with the 26th Brigade and in addition to opening a camp hospital for the brigade troops, began intensive training. On 25th March no news had been received forward of the whereabouts of the rear headquarters of the 9th Division, the 24th Brigade, or of the 2/11th Field Ambulance, but on the following day they were expected at Tobruk. The 2/11th Ambulance arrived on the 27th in a violent dust storm, camped near the beach and began to make arrangements for serving neighbouring areas.

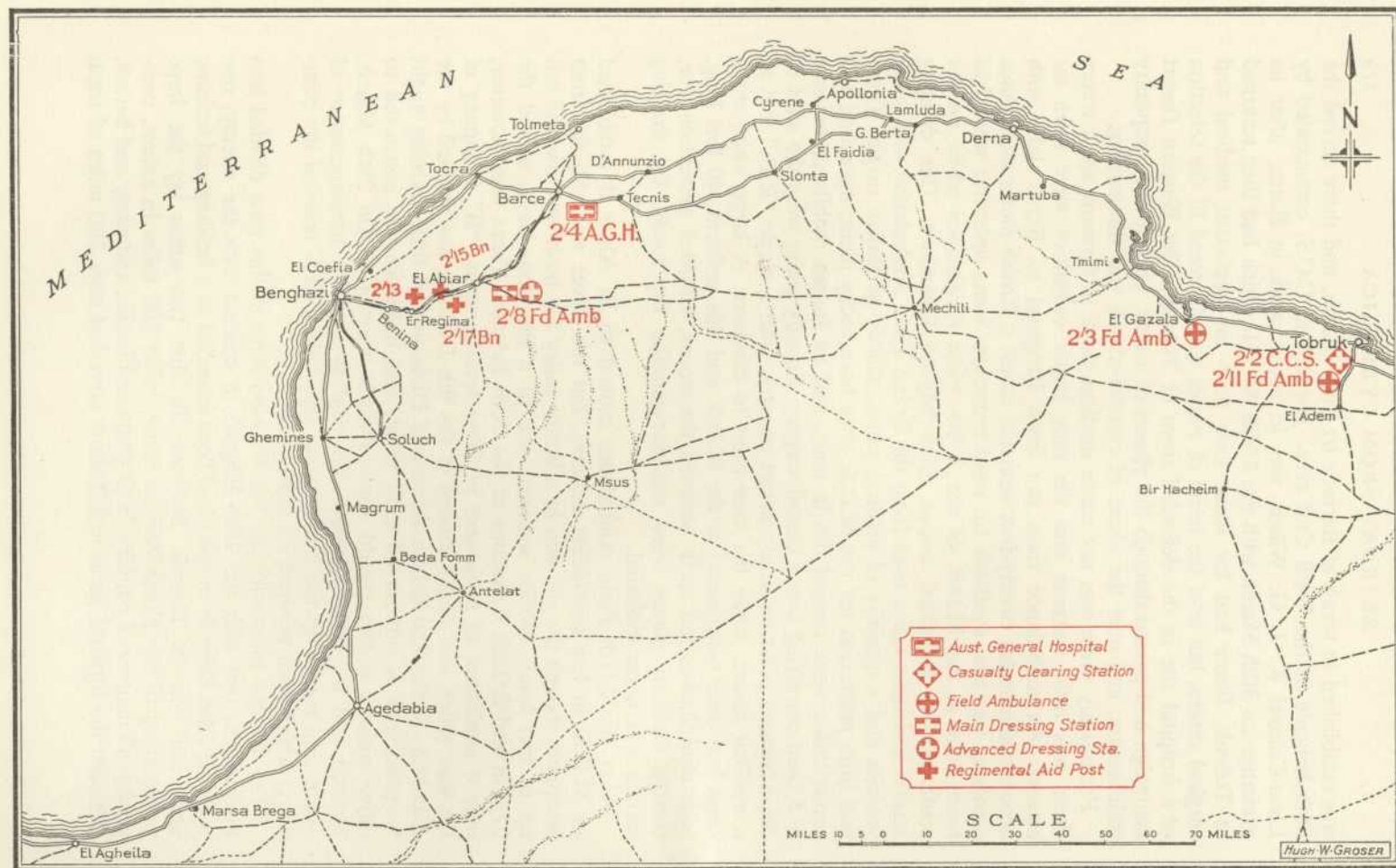
At the end of March the 9th Division, represented by only two brigades, was in a defensive position not far inland from Benghazi, while one of its three field ambulances, the 2/8th, was disposed well forward, and the other two were farther back, the 2/11th in Tobruk and the 2/3rd at Ain el Gazala. Major A. W. Robertson's company of the 2/3rd Ambulance

was established in scrub at Barraca by 30th March, and there served the 26th Brigade in the Wadi Cuff area. The 2/2nd C.C.S. commanded by Lieut-Colonel K. J. G. Wilson was in active work in Barce, after its exchange on 30th March with the 2/4th A.G.H. which had then returned to Tobruk. Barce had for some time been an important medical and surgical centre, but now the trend of events was mirrored in the selection of a hospital site in the defended town of Tobruk. The Western Desert campaign had passed through the phases of attack, pursuit and temporary stabilisation, and now the phase of counter-attack was threatening.

Fortunately there was not much medical work in forward areas where there was little sickness and the only battle casualties were from air attacks. An ambulance train ran from Benghazi to Barce daily with accommodation for twenty-four stretcher cases: a British motor ambulance company was also available for road transport. Some operative work had been done at the M.D.S. of the 2/8th Field Ambulance while on the south side of Benghazi twelve miles beyond Ghemines. This dressing station had been taken over from the 2/2nd Field Ambulance with some vehicles and a quantity of medical stores, chiefly of Italian origin. There was little protection for the M.D.S. on a bare rocky plain; operating and resuscitation were carried out in tents, and an Italian mobile ambulance had been converted into a dental surgery. Equally gaunt were the sites of the advanced posts on sandy desert country, with a single "R.D." tent as a medical centre, while the men lived in bivouacs. A large white stone cross had been constructed at the M.D.S. and this emblem, 40 feet long, with conspicuous red earth between the stones, afforded protection, for, though German planes were machine-gunning the roads, the dressing station was never molested.

After the 2/8th Field Ambulance moved to El Abiar it established its M.D.S. in less forbidding country, but the cover was still far from adequate; though the site was in a bushy valley the bush was low and not up to tent level. Mobile sections, one in a limestone cave, served the 2/17th and 2/13th Battalions of the 20th Brigade. There was, however, only a semblance of settlement in those arrangements. "B" Company of the unit which was under control of the 9th Division was notified by the A.D.M.S. of the 2nd British Armoured Division that little warning might be possible if a withdrawal took place, and therefore was instructed to move without orders should circumstances warrant it. On 29th March, Hanson and his quartermaster were sent to make a reconnaissance of evacuation routes up the escarpment. The 16th C.C.S. relieved the company, which then rejoined its headquarters.

The medical units with the 9th Division were at this time divided into three parts, one with the 20th Brigade in contact with the enemy, one with the 26th Brigade in what had been intended as a holding and training area, and one in Tobruk. Between the first two areas lay the large promontory of the North African coast, some 200 miles in extent, comprising all manner of country, both green and fertile, and stony and barren. Between the forward areas and Tobruk stretched over 300 miles of road;



Cyrenaica, 29th March 1941.

medical planning was affected by these considerations. The 20th and 26th Australian Brigades could take up defensive positions east of Benghazi, but this area could not be adequately defended by a force deficient in mobility, nor could the civil population of Benghazi be cleared from the area. The immediate problems of clearing casualties from a forward brigade with mobile sections of part of the 2/8th Field Ambulance could be solved for the time being, with an M.D.S. and C.C.S. in the background to take and pass on the patients. The 2/3rd Field Ambulance had a more static role, and, should retirement to a strongly defended area be necessary, it could bud off self-contained sections as required.

GERMAN COUNTER-OFFENSIVE

The position in the forward area was not long in doubt, as on 31st March the German counter-offensive began. General Wavell had thought from the limited information available that this might not have occurred till the middle of April or even the beginning of May, but armoured and motorised forces now began to press from the south. Mechanical breakdowns had so reduced the power of the British armoured division that it was compelled to withdraw, and unfortunately through mistaken information, a great part of its petrol supply was destroyed.

THE WITHDRAWAL

By 3rd April the position had become serious. In the neighbourhood of Barce, transport difficulties were already evident; the 2/24th Battalion had been in position for several days, but when the 26th Brigade began to move up from Gazala it was hampered by its lack of vehicles. Hanson was ordered to move his M.D.S. to Lamluda, between Cyrene and Derna. Colonel Walker took steps to ensure the evacuation of all patients from the 2/2nd C.C.S. at Barce for although few casualties were arriving, the position of the unit had become untenable. Opportunity was taken to send several patients by air to Cairo, including two suffering from fractured femur. Even after two convoys of patients left for Derna, 353 were still left in hospitals at Barce, including 56 lying patients. The remaining lying patients were taken by motor ambulances, the others by motor lorries.

Only essential equipment could be taken, the rest had to be sacrificed. At eight o'clock on the night of 4th April telephonic communication ceased, and signals brought only meagre information. Between 10 p.m. and 3 a.m. all the patients were despatched from Barce with 130 men, including 40 who had been left as a rear party of the 2/4th A.G.H., most of the light section equipment, X-ray plant and instruments, orderly room gear and papers. Through the dark to the west could be seen the glow of fires, assumed to be due to destruction of stores during retirement. The hurriedly assembled convoy went straight on to Tobruk, and arrived there by the evening of the same day. Quarters were found for the C.C.S. which had made a prompt and most successful emergency evacuation, despite the loss of almost all of the ordnance equipment, and some valuable possessions, such as the heavier parts of the X-ray plant, the autoclave, generator and lighting set.

Furnell was fully aware of the difficulty of giving medical care to a retreating force. Despite the existence of alternative roads passing through Cyrene from Barce, retirement of the forward forces must inevitably cause great traffic congestion, particularly along the latter stages of the coast road leading to Tobruk. It must be remembered that the 2/8th and 2/3rd Field Ambulances, now involved in the difficult task of service during withdrawal of a force, had not had the personal experiences of those working with the 6th Division. However, the lessons had been assimilated, and Furnell, who had the advantage of commanding the 2/2nd Field Ambulance during the advance, was thoroughly familiar with local conditions.

On the morning of 4th April a conference was called at 9th Division headquarters at 0030 hours. The position was rapidly becoming involved and dangerous. An attack by 3,000 Germans with tanks was expected on the Benina Pass where the 2/13th Australian Battalion had taken up a defensive position. Already communications were very poor, and could only be made personally by road, but they were to become even worse. On the 5th Furnell drove 250 miles in order to make contact with his men and keep in touch with the situation. The advanced headquarters of the 9th Division was retiring to D'Annunzio and the rear headquarters of the division moved back to a point east of Derna. Major J. S. Peters, who had arrived a few days earlier to take up the position of D.A.D.M.S. of the 9th Division, was sent back with the rear headquarters, and instructed to warn medical units of their immediate moves. The 2/4th Field Hygiene Section was sent back to headquarters, the movement of the C.C.S. verified, and arrangements made for mobile sections of the field ambulances to move so as to supply service to the combatant formations and units. The M.D.S. of the 2/8th Field Ambulance had to pack at short notice for the move to Lamluda, and with part of "B" Company opened there while small detachments served the 26th Brigade.

The 9th Division was assigned the role of defence of the Tolmeta-Tocra Pass-Er Regima line. On the right the incomplete 26th Brigade was without the 2/48th Battalion which was on its way. On the left was the fairly complete 20th Brigade, and a regiment of British artillery was in support. After the withdrawal of the British armoured division the 9th Division had to carry out a delaying action. The 2/13th Battalion stayed on for a time at Er Regima as a rearguard after the division had moved on, and with this unit was Gold's mobile section awaiting orders to leave. During the night an action took place at the Benina Pass, with over forty casualties. Instructions sent for the evacuation of these men were delayed in reaching the medical post, but Captain Gold, with Captain P. C. Goode, the R.M.O., energetically pressed on with this task. With the aid of various vehicles all the patients were collected, the last under machine-gun fire in the darkness, and were safely despatched.

Furnell was unable to communicate with Walker of Cyrcom by telephone, and left headquarters before dawn on 4th April on the way to Barce. The traffic was densely crowded and in a state of indescribable

confusion, through which many vehicles, disregarding security, drove with lights. At Barce the hospital was deserted; all heavy equipment had been abandoned, as well as most of the personal belongings of the staff of the C.C.S. The office of the D.D.M.S. was likewise deserted, and farther on no one was found at the divisional rendezvous. Major S. L. Seymour of the 2/8th Field Ambulance had a well set up A.D.S. in a bushy place near the road, in close contact with 26th Brigade, and the forward battalion, the 2/48th, was now in position, with its aid post working. Next morning, after spending the night by the roadside Furnell returned to Lamluda to find the headquarters of the 2/8th Field Ambulance had already set up a good main dressing station. Here he met Walker and they discussed the situation and decided to open a staging post at Slonta as an aid to the ambulance convoy working along the Derna road. Here Major A. D. Byrne and "B" Company of the 2/8th Field Ambulance were sent and during the day treated over 100 patients. It will be seen once again how constant personal contact was essential to integrate the work in hand. To illustrate the same point, Furnell on visiting the A.D.S. working with the 2/15th and the 2/17th Battalions, thought this was too far forward, and by arrangement with the brigade command selected a better site. A suitable cross-country track was also found for motor ambulances from the north to the main road.

The previous day, enemy armoured cars and tanks approached Er Regima from Benina and attacked the pass, but accounts of the movements of enemy motorised forces later proved to be inaccurate. It was thought from reports of air reconnaissance that enemy armoured vehicles were moving across the coastal plain, and along the El Abiar road, but these proved later to be elements of the British armoured division. Actually columns of the German armour followed the inland roads across the desert, and unexpectedly appeared at Mechili. It then became clear that the escarpment at Derna and the positions at Slonta could no longer be held, owing to the danger of their being cut off, and further withdrawal of 9th Australian Division was necessary. There was no alternative to withdrawal to Tobruk; the forces retreating along the main routes were exposed to threat from the south, but the extent of this was obscure, as the movements and dispositions of the German and Italian armoured and motorised forces were not clearly known. Pending further withdrawal all patients were to be staged at Slonta where Byrne and his party continued the work of the post they had set up; the motor ambulance convoy had originally been assigned this task, but on arrival had insufficient equipment.

On Sunday 6th April, Furnell instructed the officers in charge of sections with 2/48th and 2/24th Battalions of the 26th Brigade to move with these units if they were withdrawn. The 2/8th Field Ambulance main dressing station was still working busily in tents at Lamluda well concealed among the rocks and bushes; some of the patients needed operations and blood transfusions. At 5 p.m. that day an order was received to pack at once and move eastward along the desert road towards Tobruk. A.A.M.C.

and R.A.M.C. ambulances had arrived throughout the day at the dressing station and these now undertook transport of the patients. By dusk the 2/8th Field Ambulance was moving towards Derna. The smaller ambulance detachments with 20th and 26th Brigades were notified what moves were being made in case of further withdrawal, and it was arranged that final notification of moves would be left to brigade commands. While the main body of Hanson's field ambulance was moving on, in spite of measures taken to divert traffic to alternative tracks there was a great jam of vehicles on the roads. The slow pace, steep hills and poor cooling from strong dusty tail winds caused many radiators to boil, intensifying delays and crowding. Hanson, going ahead of the convoy, found abandoned and broken down vehicles also helping to block the roads. Amongst those held up by boiling radiators was Major R. T. Binns of the headquarters of the 2/8th Field Ambulance and his party.

The road led through the village of Giovanni Berta not far from Derna, and here the desert road branched from the main road to Derna; this was badly blocked, so the party took the other road. It was rough and hilly and the darkness became denser when a dusty wind arose; vehicles found it impossible to keep together, and units became separated. By midnight at the junction of the desert roads running from Mechili to Derna and to Tobruk, the stream of traffic divided, some vehicles went to Tobruk and reached there safely. Others turned towards Derna aerodrome, and amongst these were twelve vehicles of the 2/8th Field Ambulance. Binns, finding a man dressed as an Australian with a "digger" hat at this spot enquired which way the convoy had gone and was directed along the Derna road. The road ran north into a wadi, El Fetei, a few miles east of Derna where in a depression was a German party armed with small arms, machine-guns and 2-pounders. As each car turned into this basin it was captured. During the night and the next two days many captures were thus made, including Generals Neame and O'Connor and Lieut-Colonel Combe of the 11th Hussars. Major Binns, Captain G. Gilbert (quartermaster) and thirty-nine men of the 2/8th Field Ambulance were taken prisoner. Most of the medical equipment of the unit headquarters was with them in their vehicles, also the records and secret files, including the war diary. All records were destroyed by Gilbert, and did not fall into enemy hands. Among the party were all the highly trained orderlies, including the theatre staff. Despite this loss, Captain R. H. Formby reorganised the theatre department the next day; this was a difficult task, as casualties kept coming in, and no quartermaster was to hand to help with securing new stores, but the work went on. It is of interest that the only ambulance waggons of the 2/8th Field Ambulance which arrived back at Tobruk were those which had been loaned to the British light field ambulance two weeks before. Their escape was due to the individual initiative of the drivers who travelled at different times by different routes.

BACK AT TOBRUK

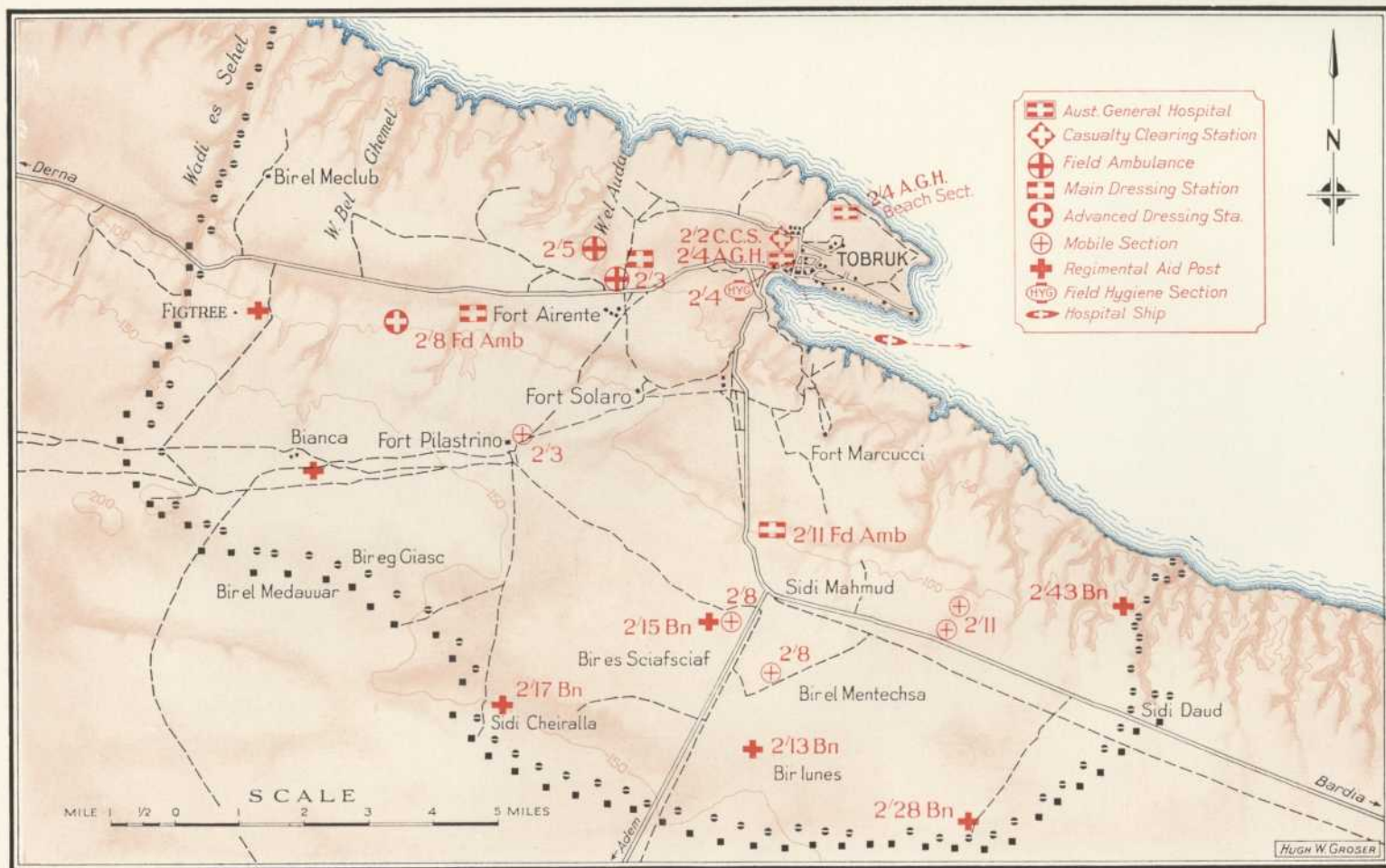
At morning light on 7th April the 20th Brigade was found ready to hold Gazala, a little east of which was the headquarters of the 9th Division. Cyrenaica Command was now established at Tobruk. It will be seen how the rapid advance of the German mobile forces across the desert had forced this withdrawal: they arrived at Mechili on 6th April, and later surrounded the defenders, though the main part of the defending force succeeded in breaking away. The remainder, including most of the headquarters of the 2nd Armoured Division, were taken prisoner on 8th April. During the day the divisional headquarters moved back towards Tobruk, and by that night was established in Wadi Sehel, inside the perimeter, the most extensive of the deep clefts running in from the coast. Furnell had arranged for seventeen casualties held in the 2/8th Field Ambulance M.D.S. to be taken into Tobruk, and then instructed the commander to pack and move at once to the site of the Italian tented hospital near the town. An ambulance post was left at the old M.D.S. to pick up patients from the mobile sections.

Next day Colonel Walker, D.D.M.S., arrived and handed over to the Australian A.D.M.S. his command of the various medical units in the area, as he was leaving for Matruh. Furnell decided to organise the medical arrangements in the Tobruk area on the basis of a mobile section to each battalion, without any advanced dressing stations. This was done with the help of extra mobile sections from the 2/3rd and 2/11th Field Ambulances, and an extra medical officer from the 2/11th Ambulance, thus making available six mobile sections. Additional motor ambulances were available too, as an ambulance had been allotted to each unit medical officer during the retreat, and some of these were now used for routine purposes. The same day, 8th April, the hospital ship *Vita* was in Tobruk harbour, emptying the hospital and C.C.S. of patients and taking back all the nurses in the area. The 18th Brigade, sent to reinforce the division in Tobruk, arrived also, with most of the 2/5th Field Ambulance.

On 9th April, there were two air raids on Tobruk, one early in the morning, and a heavy one later in the day. The divisional headquarters was heavily machine-gunned, but only one casualty resulted. This headquarters moved during the day and occupied Fort Solaro in the Tobruk area: this and other movements were rather favoured by a dust storm.

Thus ended the phase of retreat from Cyrenaica. Though complicated in some details, the general pattern of the movement was simple. The 9th Division never really settled in completely to its defensive role, as delays due to inadequate transport and insufficient equipment limited its functions. The growth of enemy strength in Tripolitania made withdrawal inevitable, especially in view of the sending of a force to Greece, and once the enemy seized his opportunity his thrust after a slow and tentative beginning forced a continuously accelerated pace on the defenders. The medical story is mainly that of a brief but well planned tactical use of one field ambulance in small mobile sections.

Had it been possible to view simultaneously the ebb and flow of the tide of war on various fronts some curious contrasts would have been seen. On the morning of 8th April, when part of the British armoured force was lost in Cyrenaica, Addis Ababa was occupied by British troops, and Massawa was entered, German forces had invaded Yugoslavia and Greece, and were then rapidly advancing on Salonika, a hospital ship was emptying hospitals in Tobruk, and taking nurses back to Alexandria, and the British and Australian troops that had but a few days earlier held Benghazi were concentrating on the Mediterranean fortress town of Tobruk which it was their duty to hold.



Tobruk, 14th April 1941.

CHAPTER 10

SIEGE OF TOBRUK

WHEN the fortress Tobruk fell on 22nd January 1941 and the British and Australian forces moved westward on the quickening tide of victory much responsible work remained to be done in the area.

FEATURES OF TOBRUK

Like other towns on this part of the Mediterranean coast Tobruk was built on a prominence closely overlooking its harbour, and from sea level rose shelving escarpments intersected by deep wadis. The escarpments rose to the plateau of El Adem, where there was an airfield, and from each rocky shelf there was a clear view over the shelf below. Farther out could be seen the Mediterranean when weather conditions permitted, but these ledges were powdery and dry, and from them, as from the face of the desert, rose clouds of fine dust when the surface was disturbed by vehicles or by wind. The isolation of the town on its northern side from the shoreward bulk of land saved it from the excessive dust of its desert hinterland, though even on the water's edge the light soil was easily stirred to pervasive clouds that laid a film over everything. Apart from the nuisance of dust the climate was good. Tobruk still looked solid and attractive from the sea, with its white buildings coming right down to the water, and its church tower standing up untouched, but it had suffered considerable damage from bombardment. One of its advantages was the sheltered port, though the value of its good wharf space was offset by the absence of cranes. In the harbour was a jungle of wrecks fringing the shore, some aground, and others protruding parts of their rusty hulls from the water. The buildings too showed the effects of air and sea attack, which had not only destroyed numbers of houses and other buildings, but had also disrupted water supply and sanitary systems. Many of the buildings, though damaged, were quite usable, and numbers of them were of substantial construction though the roofs were vulnerable to air attacks. They were clogged with dirt and rubbish; so too were the many tunnels and caves which were a feature of the defended area and which had obvious advantages and uses.

The wadis which intersected the rocky coastline bit deep into the plateau; some were particularly large, such as the Wadi Auda, at the base of the town promontory, and the Wadi Sehel some distance to the west of the town. The wadis provided shelter of a sort, and their bottoms were covered with soil; elsewhere the yellowish ground was stony and barren, with practically no vegetation. The chief sources of water were deep wells in the wadis: there were pumping stations in the Wadi Auda and the Wadi Sehel, and distilleries on the side of the harbour opposite to the town. The distilled water was purer and sweeter than the well water, which when overpumped became saline. The distillery water was designed

for the use of the navy: the water from the wadis was pumped to a tank outside the town at the junction of the Derna-Bardia roads, and was distributed from there by unit water lorries. At sea level there were beaches suitable for sea bathing. The weather was still cold, and at intervals there were severe dust storms.

TASKS OF RESTORATION

Distances were deceptively great in the Tobruk area, as the occupation force found when beginning the vast task of clearing the town and its defence perimeter. The 6th Division left behind the 16th Brigade to hold and administer the area; on 25th January Major Saxby was appointed A.D.M.S. Tobruk Base Sub-area and Captain R. G. C. De Crespigny was appointed D.A.D.H. One of the outstanding problems was the restoration of the facilities of the town so that it might be used as a forward base, and a centre for sea transport, thus avoiding the long difficult journeys by road. This was a question both of engineering and of sheer labour; untold piles of dirt and rubbish had to be removed, booby traps and mines made harmless, and unsafe buildings made habitable. Even more pressing were the considerations of hygiene and sanitation. No water supply was available when the town was taken, but engineers restored a workable supply after the first day, during which it was impossible to provide water for many prisoners.

The restoration of Tobruk was greatly complicated by the presence of 25,000 prisoners of war, who were held in a large cage six miles along the Bardia road. The captured garrison contained far more troops than had been expected; moreover, they were dispirited in defeat, and if hygiene was any measure of morale, they lacked any reasonable degree of community pride. The sanitary conditions in the prisoners' cage were at first primitive in Tobruk, as in Bardia. As soon as possible deep trench latrines were dug in the compounds, but as at Bardia, it was difficult to persuade the Italians to use them. In the original compound, prepared by the Italians themselves, the ground was too hard for deep trenches, and only shallow ones were practicable. Similar conditions had apparently occurred in the defended area, where quantities of unnecessary dirt and rubbish awaited removal. On 28th January when Lieut-Colonel K. J. G. Wilson arrived with the 2/2nd C.C.S. and took over the Italian barracks on the western side of the town, previously used as a prisoners' hospital, he found everything filthy and apparently wantonly damaged since the surrender.

Early in February rain fell heavily for two days; this caused general discomfort, particularly among the prisoners who were unprotected, even though ground sheets were supplied; the compound was practically under water, and hygiene was deplorable. The main compound was then moved to a less exposed site.

EARLY MEDICAL PROBLEMS

The risks of infection of water supplies were recognised as considerable, and it was fortunate that the hygiene organisation was now running well. Captain B. M. Carruthers with his 2/3rd Field Hygiene Section was dealing with the job of cleaning up the town, and thereby hoped to combat the invasion of flies which, like the rubbish, were everywhere. Six lorry loads of refuse were removed daily and incinerators installed. General Burston after inspecting Tobruk signalled the D.M.S. of the Middle East Forces

Consider hygiene situation Tobruk area very dangerous: essential that transport be made available urgently for conservancy purposes. Twelve lorries required immediately.

These representations helped further to improve the position. This was all the more necessary since during February the removal of prisoners from the area ceased for a month, but fresh sites were obtained for compounds, a conservancy system was organised, and members of the Italian medical service were employed to supervise hygiene. Water from wells, even from deep wells was regarded as dangerous, and the risk of infection was considerable; ideally boiling was advisable before use, but arrangements were made as soon as possible to ensure adequate chlorination of all water in the area. The distilleries were not in working order at this time, and hard often brackish well water tempted the incautious to use shallow wells. Italian disinfestors were brought into use with good effect, and vast quantities of disinfectants were used; ten tons of chloride of lime alone were expended in this early period. It was not possible to restore the water carriage system of sanitation except where discharge was effected directly into the sea, and for this reason a conservancy system was the only practicable method. These measures made great improvements, though difficulties were caused by the construction of new prisoners' cages without securing the advice of the hygiene section; the problems of hygiene in the defended area of Tobruk were only satisfactorily solved after the prisoners had been removed.

Earlier arrangements had been made regarding the disposal of Italians who were in hospital. They were concentrated in one hospital as far as possible, and were sent back to Bardia as opportunities offered. Those who were well enough travelled by road, others awaited sea transport. Notwithstanding these difficulties the general standard of health in the area was high except for the presence of dysentery of Flexner type. Rations were sufficient, though rather monotonous, and appropriate diets for sick were not easily devised.

In anticipation of the capture of the town the 2/2nd Casualty Clearing Station under Wilson and the 2/3rd Field Hygiene Section under Carruthers had been detailed, on 17th January, to form part of an advanced base under the General Headquarters. The C.C.S. packed its 160 tons of baggage with additional tentage; the heavy equipment preceded the unit, which left Alexandria on 27th January in a gale, arriving

the next day after an uncomfortable sea trip. By the 30th January thirty beds and the theatre were ready, and the following day surgical work began. The first surgical team, Major A. W. L. Row and Captain D. M. Yeates and an attached team Captains L. S. Loewenthal and J. B. Meredith began work, relieving "B" Company of the 2/1st Australian Field Ambulance which had been working there previously in an Italian hospital. Full medical and surgical services were provided, with X-ray facilities and a blood bank for which ice was available in the town. An air attack took place that day and neighbouring areas were machine-gunned. In spite of these interruptions and trouble with the hygiene arrangements, 150 patients had been admitted by the following day.

The mixture of races in Tobruk gave some trouble. After the first two weeks the troops in the area comprised Britishers, Australians, New Zealanders, Cypriots, Palestinians, Jews, Arabs and Libyans. It was not easy to arrange separate accommodation for some 16,000 to 18,000 men of varied races. The sick rate of the Palestinians was higher than that of others, and the absence of a medical officer who could speak Arabic was felt. Italian sick were being sent to a hospital along the Derna road, where 100 Italian medical officers and 600 medical orderlies could hold up to 800 patients. On 7th February the *Fawzia* arrived, an armed transport capable of taking sitting patients. The next day the British hospital ship *Aba* took over 300 patients and 116 prisoners of war. The British hospital ship *Dorsetshire* took a further number of sick on the 13th, relieving the situation somewhat, though the C.C.S. and the 2/5th Field Ambulance were both very busy.

Medical equipment was adequate for present demands; some shortages were felt, such as that of X-ray films, though this was part of general shortages in the Middle East. The 5th British Advanced Depot Medical Stores had arrived in the area, and took over reserve equipment of the 2/2nd C.C.S. and the 15th British C.C.S. at Bardia. A considerable bulk of equipment had been captured; some of this was stored locally, but the greater part was sent back to the base stores. Some of the units obtained permission from the D.D.M.S. XIII Corps to make good their deficiencies from captured equipment.

The lack of nurses was felt at the C.C.S., especially when the numbers of patients rose to peaks between the irregular visits of hospital ships, and Saxby investigated the question of accommodation for the nurses. On 20th February the A.D.M.S. thought that, although the hospital had not suffered any damage in an air raid, it would be safer out of the town area. Consequently the main body of the C.C.S. moved out on the 24th to Pilastrino, leaving a light section at the previous town site to do the surgical work. It was found advisable to retain the surgical team in the town area on account of the risk of air raids: one night raid caused thirty-two casualties eight of which came from the destroyer *Dainty* sunk off the shore. That night and the next day there were further air raids, but no damage was caused to medical units. The main part of the C.C.S. set up again at Pilastrino, where the nucleus of a small tented hospital

had been taken over from the 2/5th Field Ambulance, and where some 400 patients were in tents. Wilson's unit was working under some difficulty: the absence of nurses was keenly felt, and the rising number of patients imposed great strain on the resources of the staff. For example on 1st March a hospital ship was requested when there were 334 beds filled and by the 8th when a ship arrived there were 506 patients in hospital. Dysentery was common in medical wards; up to sixty cases were held in special tents; burns and other conditions requiring extensive dressings took much attention in the surgical wards. The original sanitary system had broken down, and as digging was difficult on the stony ground, a conservancy system was set up; old oil drums were used and burnt out by igniting oil. Water was drawn daily from water points and stored in tanks captured from the original garrison, but there was never enough water to wash patients thoroughly each day. Some of the Italian prisoners were used for labour, but were slow and inefficient. A minor but troublesome deficiency was in paper: this was felt when for example eight copies of embarkation rolls had to be furnished.

On 9th March the 2/4th A.G.H. arrived in Tobruk, after a most perilous journey from Alexandria, during which their vessel was shipwrecked. Fortunately no loss of life was suffered, and all the equipment was salvaged, as has been already described. This unit was bound for Barce, and went on by road through Derna mainly by "lorry hopping", and there with a still incomplete staff took over from Le Souef's Ambulance, which was holding 350 patients. On 18th March the threat of a counter-attack by the German armoured force in Tripolitania became more imminent: an attack was expected during April. Defensive positions were taken up by part of the 9th Division on the escarpment east of Benghazi, and troop dispositions were necessary in Tobruk also. On this day H.M. *Rosaura* carrying 400 persons struck a mine and sank in fifteen minutes; members of the crew, escort and Italian wounded were admitted to hospital, 167 in all. Through some misunderstanding the Italians were sent on from the C.C.S. to Italian hospitals instead of being held for the time being. This delayed ambulance transport but caused only temporary congestion.

On 27th March a hospital ship arrived bringing sixty-three nurses to Tobruk. Bad weather prevented embarkation of patients that day, but next day 450 sick were taken on board, and the nurses were housed in a hotel building.

THE WITHDRAWAL TO TOBRUK

By the 30th the unstable military position in Cyrenaica made the position of a hospital in Barce untenable, and an exchange was arranged between the 2/4th A.G.H. and the 2/2nd C.C.S. Most of the patients were cleared from the C.C.S. and the staff proceeded to Barce by lorries, leaving a small party in Tobruk. The 2/4th A.G.H. handed over to the C.C.S. in Barce, and leaving some equipment there, through the shortness of notice given of the move, returned to Tobruk. The C.C.S. continued

working at Barce, dealing with numbers of battle casualties, but the military position deteriorated so rapidly that on 3rd April notice was received from the D.D.M.S. Cyrcom that all patients were to be evacuated, the lying patients by ambulances, the others by lorries. Only essential material could be moved, and hastily packing as much of the light section's equipment as possible, and the surgical instruments, the unit, including forty men belonging to the rear part of the 2/4th A.G.H., joined the retiring troops on the way back to Tobruk. After only a brief absence the C.C.S. reached Tobruk on 4th April, and next day proceeded to a site by the sea on the northern side of the promontory. The 2/4th A.G.H. had already occupied the Italian barracks site which was suitable for surgical work, and had also opened a "beach section" for medical cases, with the aid of the 2/3rd Field Ambulance and some prisoners of war. The main part of the hospital was full: most of the patients came from the forward positions, Barce and Derna having been entirely cleared. Increasing numbers were being admitted as the result of machine-gun attacks on the road and of bombing within Tobruk area. The nurses gave wonderful assistance in the rush of work, but not for long, for they were not allowed to stay, and were ordered to return with the next convoy of patients. The tented section of the hospital relieved the congestion in the town hospital building, and in the opinion of the A.D.M.S. of the area would have been of even greater value if established a month earlier. As it was, both the 2/2nd C.C.S. and the 2/4th A.G.H. had worked under great difficulties, not lessened by their incidental movements.

On 8th April the hospital ship *Vita* took on board 323 patients and 63 nurses and masseuses, though its bed capacity was only 250. Some minor embarrassment was caused by the fact that the complete baggage of the female staff had come up to Tobruk with them and had to be returned.

DEFENCE PLANS IN TOBRUK

The 2/5th Field Ambulance had now returned to Tobruk, and set up an M.D.S. near El Adem corner. This unit, under Lieut-Colonel A. H. Green, arrived in Tobruk on 25th January with the 18th Brigade, and worked there in an Italian hospital, but, instead of proceeding to Benghazi as expected, returned to Egypt on 3rd March, as the unit was part of "Lustre" Force bound for Greece. As this plan too was changed, the field ambulance again turned west and resumed work in Tobruk on 8th April. During the previous day the rate of the withdrawal of the defensive forces upon Tobruk had accelerated. Enemy armour and patrols were in the neighbourhood, and had shelled Mechili, and reconnaissance vehicles had appeared on the escarpment above Derna. After a fight on the escarpment these enemy parties were repulsed, and the 18th Brigade, just arrived by sea after the Giarabub engagement, began the defence of the perimeter of Tobruk.

General Wavell, the Commander-in-Chief, and Lieut-General Lavarack, G.O.C. Cyrenaica Command, visited the area on 8th April. Wavell made the immediate decision to hold Tobruk with a defence as mobile as

possible. He hoped that in a couple of months an attack in relief could be carried out successfully, and that this would terminate the state of siege which was now inevitable. The brigades were to remain outside the perimeter if possible till 10th April, the 26th astride the Derna road, the 20th in the centre near El Adem, and the 24th on the left, holding the road to Bardia, with the 18th in reserve. On the 9th, enemy columns were approaching, and the brigades came within the perimeter.

Colonel Furnell began to make his dispositions; as described in Chapter 9 the early arrangements depended on mobile sections until the defence plan took shape. The A.D.M.S. established an office in one of the many deep tunnels in the area, and there conferred with the ambulance commanders. A field ambulance was allotted to each brigade area, corresponding with the brigades holding sectors of the perimeter. The 2/11th Field Ambulance was attached to the 24th Brigade in the east, the 2/8th Field Ambulance to the 20th Brigade in the centre, and the 2/3rd Field Ambulance to the 26th Brigade in the west. The 2/3rd Ambulance also cleared the 18th King Edward VII's Own Cavalry, an Indian unit of the 4th Indian Brigade. The commanders arranged for a gradual take-over during the day, and were instructed to form small main dressing stations, one in each unit, so that patients might be held there should road transport become too dangerous. Even on that day there was considerable gun-fire along the Derna road.

On the afternoon of the 10th at 6.30, an air attack occurred on two areas, damaged both sections of the hospital and killed thirty-five staff and patients. Many of the air attacks were from high levels, but this was not. Eye witnesses declared that a deliberate dive-bombing attack was made on the hospital buildings. These were marked by five red crosses, one on each of the small central buildings and one on the roof of the theatre block. These emblems were small but it was clear daylight at the time. On the other hand it should be recognised that there were an army field workshops, a bakery and a water point behind the building, and vehicles often collected there. Three planes dived out of the sun without warning and attacked with bombs and machine-guns: evidence of six separate bombs were found. The beach section was also attacked and two large tents were demolished. The tents here were marked with large red crosses and there were others 12 feet and 6 feet square respectively on the ground in the area. One plane of a group dived and dropped two sticks of bombs, one landing 10 yards from one of the red crosses on the ground. In these attacks Majors J. F. Chambers and Z. Schwartz were killed, Major Row was seriously wounded and thirty-two other staff and patients were killed or wounded. This attack, and others, involving the tents on the beach hospital in night raids, made the patients very nervous. Some of them took cover among the rocks towards the sea, and were not all collected for a couple of days. A considerable number of men were reported as missing from the hospital; though they had been admitted in the usual way they were neither discharged nor evacuated, and thus did not appear again on hospital records.

MEDICAL PLANS FOR THE SIEGE

This was a tragic beginning to the work of medical services during the siege. The medical units then included the 2/4th Australian General Hospital, the 2/2nd Casualty Clearing Station, a section of the 15th Indian General Hospital of 100 beds, the 2/3rd, 2/5th, 2/8th and 2/11th Australian Field Ambulances, the 2/4th Australian Field Hygiene Section, the 36th British Field Hygiene Section, the 5th Advanced Depot Medical Stores, a mobile ophthalmic unit, a mobile bacteriological laboratory, and the 16th Motor Ambulance Convoy. The last five of these were British units; after Colonel Walker relinquished Cyrenaica Command on 14th April they came under Colonel Furnell. The ophthalmic units and the bacteriological laboratory were soon sent back to Egypt, as it was found that they were not able to carry out a useful function under prevailing conditions. Local medical administration of the town area was still carried out by Lieut-Colonel Saxby, Major de Crespigny acting as Deputy Assistant Director of Hygiene.

The problems of medical attention in Tobruk were entirely different from any faced hitherto by the Australian Army Medical Services in the Middle East. When the siege began climatic conditions were favourable, except for the dust. As the weather warmed it stabilised, and for months remained remarkably regular. Before dawn the air was still, but soon after sunrise the wind rose, and blew steadily through the day, carrying dust everywhere. By nightfall the wind fell, and dust settled as the night breeze came up laden with moisture.

ATTACKS FROM LAND AND AIR

The perimeter of the defences which was about thirty miles was divided between three brigades, with another in reserve, and these troops were disposed in rather a thin line, and lived under conditions of considerable discomfort with little chance of rest. Constant air attacks caused further disturbance. After the first few days of the siege no direct fighter protection was possible, though the air force attacked enemy posts and lines of communication. Anti-aircraft defences were active from the ground forces, and the enemy sustained heavy losses in both high level and dive-bombing attacks. Artillery fire further harassed the defenders with its uncertainty and lack of warning. Movement of vehicles was also apt to draw fire, not only limited free transport, but also hampering the collection of wounded. Though the distances over which the patients had to be brought from the perimeter defences to aid posts were not great, enemy fire caused the most difficulty. Fortunately the British Navy held the sea line of communications, which permitted the carriage of supplies, rations, ammunition, mail and reinforcements, and allowed removal of the sick and wounded to Alexandria. Though shipping was singled out for attention from the *Luftwaffe*, and numbers of ships were lost, the port remained open, using the cover of night.

The enemy made prompt attempts to penetrate the defences, and on 14th April attacked from the air, by artillery, and pushed tanks through

to the edge of the escarpment between Pilastrino and Sidi Mahmud. Artillery and cruiser tanks dispersed the attackers. The field ambulances were tactically disposed when the attack began; the 2/3rd in the south end of the Wadi Auda, the 2/8th in two partially roofed tunnels, near the divisional headquarters, and the 2/11th near El Adem corner off the Bardia road. The 2/3rd and 2/11th were on very stony ground with little protection, and the mobile sections with battalions were withdrawn farther back to safer positions. There were only thirty casualties in this engagement. Furnell arranged for daily conferences with the commanders of medical units until the situation became more settled, when they were held twice weekly. One of the first disclosures at these conferences was that the number of stretchers in the area was inadequate. The next few days were quiet, and gave opportunity for defensive arrangements to be improved.

On 14th April the Tobruk fortress area became a separate command, under Major-General L. J. Morshead commanding the 9th Australian Division. The headquarters of Cyrenaica Command shifted to Mersa Matruh, and this formation then became the Western Desert Force. In the afternoon of this day occurred an event which altered seriously all plans for the evacuation of sick and wounded from Tobruk. The hospital ship *Vita* was attacked by a number of enemy planes when leaving the harbour. During the morning there had been four alerts but no planes, and each time patients had to be returned to shelters excepting those on stretchers in the boats. An ammunition ship lay on the other side of the wharf and no risks could be taken. At 5 p.m. the *Vita* left her anchorage and in the afternoon sun, her distinctive markings and red crosses should have been clearly seen against the white hull as she sailed out of the harbour. A formation of planes appeared and eight dive-bombers swooped down on the defenceless ship in what appeared a deliberate attack, while the men on the wharf screamed with rage. The effect on morale was certainly not unfavourable, rather the reverse. Fortunately no bombs hit the ship, which was carrying 422 patients, but near misses caused serious damage. The engine room was flooded and the ship helpless. The patients, most of whom could walk, were transferred to the destroyer *Waterhen*, after fruitless attempts had been made to tow the vessel. Eventually *Vita* was towed back to harbour and some days later was successfully towed back to Alexandria with the patients' baggage. Further evacuation took place after dusk by H.M.S. *Dorsetshire* which, though in the harbour at the time, was not attacked: this ship took 352 patients including 164 Germans and Italians. This incident was regarded as a violation of the Geneva Convention, and led to a radical change in policy concerning sea transport of sick and wounded. Further similar risk could not be taken, and arrangements were made for these movements to take place at night on destroyers and sloops.

MEDICAL ORGANISATION STABILISED

Morshead on 15th April decided to close the Italian hospital; those needing medical attention were sent to the 2/4th Australian General Hospital, all who were able went to the prisoners' camp. In all there were 450 patients and 500 Italian staff, the reason for the large number of "staff" being apparently the ease with which the staff could be augmented from soldiers in the neighbouring perimeter. The presence of a diversity of nationalities and races among prisoners in the area was still a difficulty. It was advisable to get rid of these as soon as possible, and as many prisoners as was practicable were sent away by ordinary ship. A few days later, on 17th April, a complete Italian battalion surrendered and came into the area.

The difficulties of sea evacuation accentuated the need for adequate shelter near the docks, for little warning could be given of the actual arrival of a naval vessel. The light section of the 2/2nd C.C.S. under Major W. Park was detached to establish a small hospital in a deep cave shelter under Admiralty House at the docks. Here it was planned to accommodate seventy to ninety patients, with provision for X-ray and operating theatre. This became the "docks hospital" and was an integral part of the medical holding units of the area. The possibility of gas being used could not be disregarded, so a gas treatment centre was established by staff of the 2/3rd Field Ambulance. Shortage of water prohibited the use of the regular supply, therefore it was sited on the coast where sea water could be used for decontamination.

The first week or two of the siege saw a considerable advance in the stabilising of arrangements and ensuring their smooth working. The main dressing stations were improved; by moving to more sheltered sites and increasing the amount of protection against bomb and shell splinters greater safety was gained and it was possible to hold patients should the prevailing conditions make onward movement dangerous. The 2/3rd M.D.S. in the Wadi Auda at that time consisted of two stone huts and emergency shelters, a dug-out and two marquees, which were made splinter proof by revetting. Dressing and resuscitation centres were provided here. Good cover was also found for one of the sections in concrete trenches in Italian gun positions. Help was given by the engineers with explosives and labour, and the Indian labour corps also gave valuable assistance in sandbagging the shelters. The general staff issued warning that the success of defensive arrangements up to this stage was no warrant of their satisfactory nature and all efforts to improve them were encouraged. Sandbags were scarce, but could be obtained for special positions such as aid posts. Risks induced by the movements of vehicles were minimised by refraining from undue movement, and the windscreens were removed to improve night visibility and to obviate tell-tale reflections of the sun's rays. Steel helmets were also painted a light protective shade and sanded. It has been mentioned above that it was found prudent to move some of the mobile sections back to safer places. This need was illustrated by the irruption of German tanks through the 2/17th Battalion

area, when a tank battle was fought across the dug-out occupied by Captain F. Viner Smith's mobile section, and a British tank actually crossed a slit trench in which the cook was sheltering. On this day, 14th April, the M.D.S. of the 2/8th Field Ambulance admitted 112 patients and found a captured German medical officer useful in treating German wounded. Unit stretcher bearers, and sometimes gun carriers brought in wounded from outside the perimeter to the forward posts. From the regimental aid posts unit transport was generally employed, but daylight evacuation was often impossible from the perimeter posts. At night and in some sectors by day it was sometimes possible for motor ambulances to move forward of the aid post. Once the patients were collected the ambulance took them to the main dressing station for inspection and thence to the hospital unless some urgent condition required immediate attention. If an action was expected the R.M.O. usually moved forward to a selected post, while the mobile section occupied the original site of the aid post. Such mobile sections consisted of a medical officer and six or more other ranks. In the first month small advanced dressing stations were established well forward, but these were found to be unnecessary and dangerous, and finally only three very small advanced dressing stations were used in the whole area.

Ambulance waggons from each appropriate field ambulance were distributed, one to each unit aid post. Occasionally a waggon was damaged by enemy action, but this plan was found to be very valuable. The whole arrangements were thereby accelerated, and the interests of the patients and of administration were alike well served. The problem of location and evacuation of wounded from scattered units like the artillery, the armoured brigade and anti-aircraft arose as it had during the campaign in the desert. It was solved by having a motor ambulance from the M.A.C. with each unit manned by unit personnel. Experience proved that this worked well.

It was fortunate that more disturbances of administration did not occur as the result of air attack. On 19th April a direct hit from a bomb occurred on the sub-area headquarters; several were injured, including Saxby, who narrowly escaped serious injury. The effects of the office were scattered and damaged, but work was soon going on as usual.

The peculiar conditions of the area also affected the functions of a general hospital. It was evident that in this community only men capable of work for the community or those needing only brief periods of rest or treatment could be justifiably retained. On 14th April by order of General Morshead, Colonel Furnell issued an instruction to all regimental medical officers that no man was to be evacuated from unit lines unless too ill to fight. Similarly men admitted to hospital who needed extended treatment were sent back to the base when opportunity offered. This really meant that the hospital was working more or less as a casualty clearing station. This in turn increased the turnover of the hospital and imposed great strain on its staff. The 2/2nd Casualty Clearing Station was rather unhappily placed. In its rapid dash to Barce and back much

of its equipment had been lost, though it carried out a useful function in deep shelters at the docks area where patients waiting embarkation were held.

During this early period of the siege the problems of hygiene arose, lessened in urgency by the hard work already carried out by the sub-base administration, but made more difficult by the dispersal of troops through the area, the need for defensive measures and the presence of an aggressive enemy. The numerous dug-outs, caves and tunnels of Tobruk increased and complicated sanitary problems. An immediate and vigorous campaign was undertaken against flies, which had not been a serious menace during the cool weather, but which were beginning to multiply more rapidly with the oncoming warmer months. The danger of transmission of dysentery and other diarrhoeal diseases was great in the area and increased by the presence of prisoners of war. Though the numbers of prisoners held were much reduced there were still some 10,000; it was found necessary to concentrate them in a cage to prevent escape. There was still necessity for constant supervision of the sanitary arrangements for prisoners, which were far from good. This does not imply that the hygienic conscience of the troops was good; it too was often very faulty, but constant education of officers and men and pressure from the unit medical officers produced better results. Sanitation had been satisfactorily established with a conservancy system when the siege began, but was further simplified by the construction of a large Otway pit. Disposal of refuse was also now a task within bounds, some sea disposal was practised, but incinerators were also constructed. The field hygiene sections, the 36th British and 2/4th Australian, acted more in an advisory and supervisory capacity, as hygiene was a unit responsibility. The supervisory work was divided between the 36th Hygiene Section under Major McQuillan, R.A.M.C., which cared for the town area and the 2/4th Section under Captain Fryberg looked after the rest of the fortress area. As the town was cleaned up more troops were accommodated in billets, and though many of these were in well ventilated houses of recent construction, a good deal of supervision was necessary. Occasionally a change in the occupancy of areas would bring forth complaints and reproach from incoming tenants, a reaction which probably did some good. The Libyan refugee battalions, attached to 102nd Military Mission, though well disciplined, required some watchful care, but the Libyan working battalion, some 1,100 ill-disciplined Arabs, caused anxiety by fouling barrack rooms which they used both for sleeping and cooking. Latrines over the water were constructed for these men. There were many insect pests in the area; in addition to flies, fleas were numerous, and, though only a harmless nuisance they caused much discomfort. Ticks were present in many of the dug-outs and caves, and as tick-borne relapsing fever was a disease of the country, the risk was present. Lice were not common; disinfestors were used in every M.D.S. and in the prisoners' accommodation and served to keep them in check. Bugs were also found in some of the concrete forward posts, but the blowlamp was found effective in eradicating them.

Water has been previously mentioned. The distilleries were put in order and a supply of good water was obtained fit for all purposes. The chief supply was from deep sources in the Wadi Auda, from which it was pumped and supplied by pipe-lines to the town. At the water points chlorination was carried out as each truck was filled, and each unit was left to do its own detasting. Hospitals received a gallon and a half daily of well water for each patient and a gallon and a half of sea-borne water for drinking and surgical purposes. A reserve supply of this good water was always kept, following the practice of the Italians, who brought drinking water from Italy in storage tanks. Water from the shallow wells was sweeter than that from deep wells, consequently the men often preferred it, though there was danger of surface contamination and constant supervision was necessary to ensure it was chlorinated. On one occasion a field bakery was found using well water of a high bacterial content without sterilisation. Shallow wells had a high saline content only if over-pumped, but deep well water was highly mineralised. One of the features of Tobruk was the number of private extemporised stills, for the production not of alcohol but of water. An ice-making plant on the docks produced a good supply of ice which was distributed to medical units daily, and was kept in ice boxes. It was fortunate that no serious interruption to the water supply took place: on one occasion the pumping station was hit in a raid but only minor damage was done.

For a time during the early period the 2/3rd Field Hygiene Section operated a block of thirty-six showers near the hospital. Men from field units, many of whom had not had a bath for two months, brought in companies by rotation, enjoyed the luxury of a shower, even though its duration was limited to exactly three minutes to conserve water.

The laundry requirements of the hospitals caused difficulty. An air raid damaged the laundry of the town hospital and temporary arrangements were made for men at the 2/8th Field Ambulance to help in washing until repairs could be made, when the ordnance branch took over this work.

General health in Tobruk towards the end of April was satisfactory. Special warnings about flies and dysentery were written by Colonel Furnell for inclusion in the divisional routine orders. Rations continued to be ample and of satisfactory quality and good bread was produced by the field bakery. More will be said of this later. Fresh foods were naturally scarce, and the A.D.M.S., after ensuring that there were adequate stocks of "Marmite" (13,764 lbs.) and ascorbic acid tablets (1 million), arranged for their immediate distribution.

Medical attention was well provided for, though the C.C.S. was hampered by lack of equipment. The remainder of the 2/5th Australian Field Ambulance arrived on 22nd April, and the same day all but two of the mobile sections were withdrawn behind the second defence line. The 2/4th A.G.H. was holding over 530 patients at this time, of whom 150 were Italian and 30 Germans. Four hundred patients had been admitted to hospital in the area during the preceding week, but this was only 1 per cent of the force. About this time the problem of neuroses in Tobruk

began to be serious. This will be discussed later in greater detail from the medical point of view. The increasing numbers made some adjustments necessary in the medical units. Arrangements were made for all men sent back from the aid posts with a tentative diagnosis of "NYDN" ("not yet diagnosed, nervous"), to be taken to the M.D.S. of the 2/3rd Field Ambulance where Major H. R. Love could hold them and divide them into various categories. This use of a main dressing station as a sorting centre facilitated the early decision whether a man should be sent back to his unit or admitted to hospital. This eased the strain on the town hospital, though extensions to the beach section were being made which would permit the treatment of more patients there. It was evident that the town hospital, which, though strongly constructed, was in a target area, and unsuitable for housing patients of the nervous type.

PROTECTION OF MEDICAL UNITS

The intensity of air raids made it necessary to take particular precautions that the Geneva Cross should be well displayed on hospital areas. As most of the attacks were from planes flying at high elevations it was doubtful if the red crosses could be seen unless they were quite large. Even crosses on hospital ships were not easy to recognise from high levels, and the correct colour for a conspicuous sign was not always available for use. From 15,000 feet it was said that a red cross should be 75 feet in diameter to be easily seen, whereas 30 feet size is generally considered a large size. As previously remarked, the presence of a hospital building actually in the town almost precluded immunity from artillery fire and high level attacks. The beach section of the hospital was again hit during one of the heavy air raids which took place at the end of April. These raids had already caused a good many Australian casualties, and on this occasion, on 29th April, three patients were killed and seven wounded. This beach section was really in the line of approach of hostile planes and in another way was not well placed with regard to safety, for ammunition dumps surrounded the area. Protests were made about the last named hazard, and the ammunition was removed. It is of course recognised that where the available space is limited, as too often it is, dumps of fuel and ammunition or other tempting targets must be placed somewhere convenient, but medical installations often need to exercise vigilance in this regard.

THE BEACH SECTION OF THE 2/4TH A.G.H.

The beach hospital in its first site was dug in to a greater extent, and its protection improved, but it was apparent that both town and beach sections required stricter measures for air defence, to preserve safety and maintain morale. The rising incidence of neuroses and fear states was another factor to be considered. It was evident that wards for the handling of patients with these conditions should be safe and reasonably quiet, and it was also essential that those men who were likely to be returned

to work after a brief period of treatment should have every chance. Therefore the preparation of a new site for the beach hospital was begun. The wards were made splinter proof and an arrangement adopted by which large "R.D." tents with roofs painted red were pitched in the form of a Geneva Cross. It was curious that at the time of the early attacks on the first beach section some patients who were then under treatment for venereal disease and quite fit for light work, were unwilling to make their own tented wards safe. Valuable help was given by the sappers in establishing tented hospital accommodation, especially in making shelter for the main dressing station in the Wadi Auda. Some three hundred Libyans were put on to work on the beach hospital and thus the digging in of the tents was completed. The provision of a number of air raid shelters and slit trenches made this section now fairly safe. The town hospital recognised the need for more red crosses on the roof, but lacked men for the work, owing to the strain of hospital duties proper. Some men from the field ambulances started this job, and it was completed by native labour. Red paint for the crosses was very scarce, and trial was made of red lead and oil. The town hospital concentrated as many patients as possible in the better protected parts of the buildings, and shelters were built in front of almost every ward. The operating block was rendered practically bomb proof by using sandbags, thus allowing surgical work to proceed during air raids.

In the beach hospital and other tented units the most useful tents were the "E.P.I.P." type, which were erected in groups of five, each holding eight patients. The floors of the tents were sunk 18 inches to the rocky bottom and the walls sandbagged up to 4 feet. Beds were of the stretcher type, but the legs were not used; the frames were supported on stones so as just to clear the floor. The centre tent was used as an office, and the cruciform clusters, themselves of the shape of the Geneva symbol, and holding thirty-two patients, were further grouped in threes, arranged in a triangle. Each of these ninety-six bed units was spaced 150 yards apart. This better dispersal ensured much greater safety, and no lives were lost at the Wadi Auda beach hospital thereafter in spite of bombs. Dive-bombers frequently went out over the beach hospital, but though they flew low they did not attack. It was thought there that air attacks on such areas were of the nature of reprisals.

IMPROVING THE DRESSING STATIONS

At the end of April the policy of using all possible protection for sick and wounded was furthered by establishing the main dressing station of the 2/11th Field Ambulance in the cave shelters at Sidi Mahmud, which were dug into the side of a hill. Out of a central space opened large rooms with high arched roofs lined with concrete: each room could accommodate at least twenty patients, and in one of the rooms an operating theatre was set up.

The dental condition of the troops was bad. Dental centres were opened early, and the dental officers of the field ambulances were soon at work.

They worked in considerable difficulties on account of the pervading dust, and air raids caused not infrequent interruptions. The centre opened by the dental officer of 2/3rd Field Ambulance suffered a setback early, for the day after work started there the dental truck, left unattended during an air raid, ran backwards and demolished the centre. Accordingly, arrangements were later made to house a combined dental clinic in a cave at Sidi Mahmud. Conditions here were cleaner and work could be done in safety. Lighting was a problem not easy to solve at first, but the engineer service arranged electric light with little delay.

NAVAL TRANSPORT OF SICK

The problem of evacuation was solved early in May. The bombing of *Vita* had caused serious doubts concerning the immunity of hospital ships from attack. On 26th April anxiety was caused by the hospital ship *Karapara* fouling the boom on leaving harbour in a dust storm, thereby causing delay till the small hours of the morning. Three days later hospital numbers were mounting and a ship was again requested. On this day a supply ship was sunk in the harbour, and on 4th May there were further heavy air raids. The divisional headquarters was bombed, and the main dressing station of the 2/8th Field Ambulance; there were two killed and three wounded. In this raid the *Karapara* was bombed by about eighteen planes of a separate formation just when starting to embark patients. A direct hit on the engine room put one engine out of action, and the ship, carrying 164 sitting patients, left with only one engine working. Though it was believed that well displayed red crosses were respected on the ground, there seemed to be little respect for them when afloat. After these experiences evacuations took place by destroyers and smaller naval fighting ships. There were certain difficulties in this arrangement, as will be told later, but compensating advantages. In spite of the necessity for loading and despatching the ships at night and in spite of the short time available, the use of the safe shelters of the docks hospital made this method quite practicable. Further, if delay in the arrival of a ship occurred the patients could be fed and looked after for a short time in the shelters. At first some delay was experienced due to the presence of mines in the harbour, but thereafter the embarkations ran smoothly, and kept the hospital bed state steadily at about 500 beds. Fewer patients could be transported than by the hospital ships, but they were lifted more frequently.

DEMANDS ON MEDICAL SERVICES

During April the defenders were by no means passive, and made some successful sorties in which they took numbers of prisoners. After 25th April the Royal Air Force was forced to withdraw the No. 73 Squadron because of losses, and after this, except for a few light bomber attacks on gun positions no more help could be given to the fortress by fighters or bombers. Early in May another attempt was made by a combined German and Italian force to take Tobruk, but, though many tanks penetrated the

perimeter and flame throwers were used, the defenders repulsed this assault with delaying action of their tanks and counter-attacks. In this engagement 32 British and Australian troops were killed, and 120 wounded. All the medical arrangements proved equal to demands during this attack. It was during this land action that the damaging air raids occurred mentioned above. The divisional headquarters were heavily bombed also, and several were killed and wounded in an air attack which involved the 2/8th Field Ambulance main dressing station. On 4th May there were more casualties; 51 from the 2/12th Battalion came through the M.D.S. of the 2/3rd Field Ambulance. The total patients in hospital after this action numbered 750, with 206 in the beach hospital: 209 Italians were in hospital also.

Attacks on the enemy during May caused them to be on the defensive, and an attack was planned by the Western Desert Force to open the road to Tobruk. Apparently the Germans had information that an attack was being launched, though the defenders did not receive details of their part in the action till 13th May. This attempt to relieve the garrison force did not succeed; casualties were 115 killed or missing and 59 wounded. Special medical arrangements were made for this action and also for a post for collection of walking wounded, and a route through a gap was selected. One conclusion reached was that it was most important for field ambulances to ensure that food and enough blankets were to hand to meet requirements, and to have hot drinks and food continuously available while the action lasted.

TREATMENT OF NEUROSES

During the period in May intervening between the second German assault on the defences and the British attempt to relieve Tobruk by land, the problem of neuroses had assumed significant proportions. In the early weeks of the siege minor wounds were sometimes seen of a type suggesting self-infliction. Later, at the beginning of May Lieut-Colonel Littlejohn reported thirty cases, chiefly of bullet wounds of hands or feet, occurring in a space of five days. By divisional command all such cases were investigated, and only on divisional authority could the hospital discharge these men. The importance of speed in these enquiries was realised, but a Court of Enquiry was held before each man left hospital where any doubt was felt as to fault or default or intention. No man was classified as suffering from a self-inflicted wound till a decision was given by higher authority. The staff of the town section of the 2/4th A.G.H. recognised that the hospital was not "a popular boarding house", and the men could not but feel this also when air raids were frequent. Several under investigation were killed in a raid one day, a fact which in itself seemed to be a factor in lessening self-inflicted wounds. The type most commonly seen was injury of the end of the little finger or between the fingers. Later still, when conditions in the fortress were more stable no wounds of this type were seen. There was definite evidence of the connection between their occurrence and frequency and the existence of tension in the military

situation. After the failure of the attempt to relieve Tobruk there was some noticeable depression at first, but this was soon replaced by a heightening of spirit due to realisation that the enemy under-estimated the capacity of the beleaguered force, which could meet him on equal terms.

The type, incidence and treatment of neuroses are dealt with in Volume I in the chapter on psychiatry. The peculiar self-contained conditions of Tobruk made it necessary to keep every man who could be retained with profit, and therefore the earlier his condition was assessed and treated the better. Yet it was important not to retain those who might impart to others the infection of fear. A concreted cave, called "Z" ward was prepared near the town section of the 2/4th A.G.H. for the housing of men with fear and anxiety states: it could hold fifty patients. This ward was at times noisy when air raids took place, but later these began to lessen in number. Alarming reverberations worried some patients but the ward was safe. It was used both as a consultative and treatment centre, and was under the direct control of Lieut-Colonel E. L. Cooper. The preventive aspect of neuroses was not overlooked: indeed it was regarded as of prime importance. The work of R.M.Os. was in this respect invaluable, and was always under review while the officer himself had opportunities for constant contact with his seniors; clinical conferences were held in Tobruk, and if explanation, help or criticism was necessary action was taken. During the action at the beginning of May an undue number of men were sent from one aid post, classified as "NYDN", but this was controlled by a change of medical officer. No officers were sent back with this diagnosis except with the sanction of the A.D.M.S. Early in the course of a breakdown men were investigated individually, and if admitted to "Z" ward they were further examined and treated along orthodox psychotherapeutic lines. Even more important than all this from the prophylactic point of view was the air of ascendancy over difficulties, which, under its resolute command, was a feature of the force.

FACILITIES AND METHODS

During May further arrangements were made for the carrying out of medical and dental work under conditions of greater safety and comfort. The caves at Sidi Mahmud, four miles along the road to Bardia, already in use, were arranged to accommodate the heavy section of the 2/2nd C.C.S. as well as the M.D.S. of the 2/11th Field Ambulance. Lieut-Colonel Wilson, commander of the C.C.S., fell ill at this time, and early in June was sent back to Egypt. Major W. Park succeeded to the command and was promoted lieut-colonel. These underground shelters dug into the side of a hill and roofed with concrete, were lit by electric light installed by the engineers. Deep shelters and passages provided an operating theatre, rooms which could hold in all about 200 patients, and accommodation for officers and men on the staffs of the units working there. Here the combined dental unit was now conveniently housed, using a good dental set, comprising chair, X-ray and electric motor captured when Tobruk was taken. At first instructions were given to return the motor to

Alexandria, but as the voltage of 160 only suited local conditions it was retained. The work was so planned that one day a week was given to each battalion by appointment; all dental officers concentrated on these men and kept a day at the end of the week for clearing up uncompleted work.

By the beginning of June the standard of hygiene had appreciably risen in Tobruk, thanks largely to the hard work of the 2/4th Field Hygiene Section and the cooperation of unit commanders. Infectious diseases had not so far made serious inroads on the force. Though the warm weather favoured fly breeding, this was kept under reasonable control, and as a result, dysentery, though occurring in moderate amount, was not a menace. No severe toxic types of dysentery were seen, nor any requiring parenteral administration of fluids. Some Shiga types were recognised, but these clinically resembled the Flexner infections and were not troublesome. Small supplies of sulphaguanidine were available and it was apparent that this drug reduced the period of acute illness and toxæmia, and the time in hospital. Malaria did not occur, and no proven cases of typhus were found. Relapsing fever of the tick-borne type occurred, but the numbers were small.

ATTEMPTS TO RAISE THE SIEGE

On 15th June Western Desert Force again attempted to relieve Tobruk by land by an operation known as "Battleaxe". The drain on shipping was being felt, for the toll of vessels from the air was considerable, and the port could not be used by day. A sixty days' reserve of supplies had been built up within the fortress, but without reserves 150 tons per day represented minimum requirements. The British force attempted to drive the enemy west of Tobruk, and the four brigades inside Tobruk attacked several points on the perimeter. The Germans resisted strongly, and on 19th June the Western Desert Force withdrew. This was depressing for the garrison, but attacks on enemy positions went on, especially at night or in the unpleasant dust storms which frequently swept Tobruk. Patrolling and mine clearing proceeded as before: however, the change in the position was evident. The hope of relief within two or three months had not been realised, and the change of operational control from the Western Desert Force to General Headquarters in the Middle East confirmed the belief that only a reorganised external force with superiority in mobile armour could break the siege. The enemy reinforced his artillery, which now included a gun of 155 millimetres, known locally as "Bardia Bill". This gun, though of uncertain aim, had a high nuisance value, especially for ships loading and unloading, and its unwelcome and unheralded attentions harassed the region of the town hospital. Another gun in the south-west sector attacked the Wadi Auda, and once hit the pump house, fortunately with but slight damage. It was remarkable how well some of the buildings in Tobruk had withstood attacks from air and land. The former Italian barracks, occupied by the 2/4th A.G.H. had been battered severely; parts of some wards were destroyed, but most of them could still be used. The roof of one ward was penetrated by a bomb which

caused ten casualties without materially damaging the walls, which were three feet thick.

CURRENT CONDITIONS

Major H. M. Trethowan, D.A.D.M.S., A.I.F. made an official visit to Tobruk at the end of June, and sent a comprehensive report to the D.M.S. covering all aspects of administration, medical work and supplies. One question which may be again mentioned here was that of rations. An effort was being made to build up a ninety days' supply of essentials, such as meat, flour, sugar and tea. Vitamin supplements were given in the form of ascorbic acid tablets, "Marmite", and Atta flour for bread making. Atta was a rather heavy flour containing wheat germ but made ropy dough and was weevilly. English flour was of good quality and an Egyptian flour was also in use: a proportion of 65, 10 and 25 per cent gave a good loaf. Trethowan reported that while rations were good and adequate more attention could be paid to the cooking and presentation of food. Some trouble was experienced also in feeding Indian troops who would not eat tinned meat: the Mahommedans regarded the beef as polluted, and the Hindus would not eat it; some increase had been made in the milk ration, and iron was issued for the treatment of anaemia which occurred in these men. Fresh meat was available only in limited amounts in Tobruk, owing to difficulties of shipment. Freezers were working during the later stages, and once thirty-five sheep arrived.

During June some anxiety was caused by a diminishing supply of stretchers, which were taken away on destroyers with patients but often were not returned. Some hundreds were also lost through enemy action. This difficulty was met by arranging for eighty stretchers to be brought back on each destroyer; the number despatched with each embarkation was signalled to the D.M.S., and weekly returns were made to the A.D.M.S. by medical officers of the numbers held by them. In spite of this troubles continued. Furnell wrote to the general headquarters in Cairo, and asked General Tomlinson to have a request sent to the Commander-in-Chief for a directive. In August when Furnell was in Cairo he made further representations and a great improvement followed. There was some trouble too with increasing incidence of dysentery. An excellent system was devised for the control of hygiene of all units and posts, whether actually in the line or in reserve, whereby an inspector from the 2/4th Field Hygiene Section was attached to each brigade, and lived with each battalion in turn. Fryberg reported that daytime inspection of certain posts was not practicable on account of the activity of the enemy; these were inspected at night. A most useful gift of 2,000 metres of fly netting for hospital use was made by the British Red Cross and the Order of St. John in the Middle East. A special difficulty with regard to the transmission of diarrhoeal disease arose in June when the attempt was made to raise the siege. Men with mild diarrhoea were sometimes held in their own lines, but on the occasion of this important event these men were sent from the front line, and convalescents after dysentery were returned to Egypt to lessen risks from carriers. Naturally with patients of this type, and



(S. J. M. Goulston)

A desolate R.A.P. soon after arrival on the
Derna Road Sector, Tobruk.



(Australian War Memorial)

"Figtree" R.A.P. Tobruk



"Living quarters", Tobruk.

(Lent by N. L. Speirs)



Dispensary, 2/4th A.G.H. Beach Hospital, Tobruk.

(Lent by N. L. Speirs)

especially with those who had a nervous disability, opinions differed as to who should stay and who go. Under ordinary conditions convalescents of various types could be held at the C.C.S. at Sidi Mahmud or at the beach hospital, and returned to duty or to a convalescent camp which had been set up not far from the beach hospital. If the medical officers at the C.C.S. considered that some men should be sent back to base, Sidi Mahmud was not a convenient place for holding them, as it was six miles from the docks, whereas the docks shelters were ready at any time a destroyer arrived. During June steps were taken to coordinate the medical services in such details and to adapt routines to the peculiar conditions in Tobruk. The need for an A.D.M.S. of the town area was now disappearing, as all services could be administered by Colonel Furnell. During July Lieut-Colonel Saxby concluded his duties and handed over to Major de Crespigny, D.A.D.H. who was then appointed D.A.D.M.S., and as Lieut-Colonel M. L. D. McKeon, commanding the 2/3rd Field Ambulance was ill and had to be sent back to Egypt, Saxby replaced him in this command on 22nd July.

Arrangements for evacuations on the small naval ships continued to work well during July. For a destroyer 50 lying cases was the optimum number, and 100 the maximum: in addition 150 walking patients could be taken. Sloops were not suitable for lying patients, but 100 of other types could be accommodated. At first palliasses on deck were tried, but these were not a success, stretchers were much better, and easier to load. In spite of arrangements made to return stretchers it was a constant struggle to keep a reserve in Tobruk. Loading was done from lighters alongside, and lying patients were accommodated in the forward mess deck, and also aft, if stretchers could be manoeuvred down ladders. Surgeon-Lieutenant McLean of *Stuart* devised a method of slinging stretchers by short ropes from hammock ties: this was found comfortable by the patients and lessened congestion. A sick berth attendant helped to supervise the patients in the mess decks: other stretchers were placed in the forward galley, or on the deck, where the men were given two blankets and screened from wind and spray as far as possible. Patients able to walk went to other messes, and filled up all available spaces on the ship. Personnel of the A.A.M.C. embarked for some early runs to look after the wounded. Some such arrangement was ideal, but not always possible. Nursing procedures were extemporised during the short run along the coast; little food could be prepared unless a galley was free, but tea was given to all able to take it. One naval medical officer remarked that most of the difficulties in the Tobruk run were physiological: only the brevity of the trip made it possible to manage with the ship's supply of bed pans. The strain on the ships' staffs was great: many of the sick berth attendants became very tired, but made no complaints. Ships' staffs as a whole rendered most valuable assistance in looking after the patients, and some seamen spent their watch below in tending those who needed care.

Air attacks fluctuated in intensity, but damaging attacks continued: it was remarkable that more damage was not done. The garrison of Tobruk learnt with great regret of the sinking of the destroyers *Defender* and *Waterhen*, but in spite of these losses, and the serious loss of two large ships with consignments of stores, supplies and reinforcements still came in and sick and wounded still went out. The contest was not one-sided, for heavy losses were inflicted on enemy troops, their advances were checked, and enemy planes suffered losses from anti-aircraft defences: in the June action alone eighteen dive-bombers and fighters were shot down. Medical supplies of some items were very scanty. Plaster of Paris, drugs, especially sedatives, and X-ray films were very scarce, due to general shortages and to some extent to enemy action.

THE 2/2ND C.C.S. RETURNS TO EGYPT

The position of the 2/2nd Casualty Clearing Station came under review at this time. This unit, after hard work before the investment of Tobruk, had been forced to abandon much of its equipment during the hasty retirement from Barce, and since then had not been able to fulfil its true function. In Sidi Mahmud much of its work was that of a convalescent hospital, with the concomitant annoyances of being used as a convenient shelter from raids or as a rest station. The light section in the docks hospital acted as an evacuating unit, and Furnell had not been able to restore surgical activities to its duties. Actually, as has been pointed out, the 2/4th A.G.H. was acting as a casualty clearing station rather than as a general hospital. It will be remembered, too, that early in May the 2/1st Casualty Clearing Station, which had been recalled for work in Nazareth during the Syrian campaign, was the only Australian unit of its kind in the Middle East that remained completely functional, since the 2/3rd C.C.S. lost all its equipment in Greece. Therefore the 2/2nd C.C.S., having played its part, was recalled to Egypt for refitting at the end of July. The site of Sidi Mahmud was then occupied by the 2/11th Field Ambulance and the field ambulance took over the docks evacuation hospital.

FURTHER ACTIONS

On 29th July there was a heavy German attack on the Medauur Salient, and this was followed by a planned attack by the 24th Brigade. The 2/43rd and 2/48th Battalions suffered heavy casualties during this action, but the enemy's losses were much heavier. The 2/3rd and 2/8th Field Ambulances covered the medical requirements. Care was taken to maintain adequate communication with motor ambulances, and a staff car was at hand at a battalion post to bring back any news of a move. Stretcher bearers acted as guides whenever a post moved: this was found to save useful time. Additional bearers were made available forward, but even so collection of wounded was slow. From the 2/3rd Field Ambulance posts it was found best to send casualties direct to the M.D.S. whenever this was possible, but a mobile section was found useful at the aid post of the 2/28th Battalion to permit the R.M.O. to go forward.

The enemy withheld fire to permit collection of wounded during daylight, and the 2/8th Field Ambulance was able to use a lorry marked with a red cross, which picked up casualties brought back to the wire by stretcher bearers. Chaplain Gard and a stretcher bearer sergeant from the 2/43rd Battalion, drove in a truck marked with a red cross to a German post, where the Germans warned them of minefields and gave them assistance in picking up wounded. An engineer even made part of a minefield safe to permit collection of the body of one of the dead. Unfortunately our artillery shelled a post over which the Germans had a red cross and the chaplain was angrily informed that no such truce would be permitted in future. The next day one of our lorries marked with a red cross was fired upon. On the opposite side of the perimeter, the 2/11th Field Ambulance received two truck loads of casualties direct from 2/23rd Battalion. It appeared that the driver knew the location of this M.D.S. and was not familiar with the whereabouts of other though closer posts.

The attack was only a partial success on the right flank but failed on the left, and one captured post was retaken a day later by the Germans. By 10 a.m. on the first day 100 casualties had gone through the dressing stations of the two ambulances and within the first twenty-four hours 127 battle casualties had been handled by the 2/4th A.G.H. where three surgical teams were at work. On the third day a hundred patients were taken by *Nizam*, an illustration of the promptness of this method of evacuation. Immediately after this action there was considerable air activity; one hospital ward received a direct hit causing a number of casualties, some fatal.

Question of Relief

Early in July General Morshead went to Egypt for a conference. He wished if possible to have another brigade group in Tobruk, which would make possible operations outside the perimeter, but the Commander-in-Chief could not spare additional troops. The 18th Brigade Group was needed for Syria, and arrangements were made for its relief by the Polish Independent Brigade Group. For these movements new and repaired berths were made ready on the jetties, and camouflaged, and corresponding increases were made in the medical staff of the docks hospital from the staffs of the 2/8th and 2/11th Field Ambulances, so as to cope with large landings or embarkations. The Polish brigade arrived on 19th August. By the end of the month Polish medical officers and men were working in the 2/4th A.G.H. looking after their own sick, and after a few weeks a complete Polish ward was established with a Polish staff, even including ambulance drivers from their supply column. Polish sections were attached to all field ambulances carrying out operational roles, and a Polish field hygiene section replaced the 36th British Field Hygiene Section. A Polish dental officer also worked in the dental clinic in Sidi Mahmud. When detachments of officers from these units were attached to the messes of the 2/8th and 2/11th Australian Field Ambulances, and of 2/4th A.G.H., language difficulties were considerable, but were soon surmounted. At this time too, replacement officers arrived in Tobruk to relieve officers

of 2/4th A.G.H. The 2/5th Field Ambulance embarked for Alexandria on 23rd August, with the 18th Brigade.

The question of relief of the 9th Australian Division now became a live issue. Two months earlier plans had been drawn up for the evacuation of the garrison by sea at night, but this was a close secret, known only to the commander and senior officers, though there was no suggestion that such an event was likely since relief from Egypt was not possible till November. The freeing of the 18th Brigade from Tobruk showed that A.I.F. troops were needed elsewhere, and exemplified the principle of maintaining cohesion of the A.I.F. as a fighting force. General Blamey was anxious to keep his command unified; experience with the First A.I.F. had proved the desirability of this, and the Australian Government had requested that the divisions of the Second A.I.F. should be kept together. Accordingly General Blamey reiterated strong requests to General Auchinleck, the Commander-in-Chief in the Middle East, that the 9th Division should be relieved, and to these added another argument, that of the deterioration of the physical state of the force in Tobruk after some months of fighting under trying conditions.

HEALTH STANDARDS

In general the standard of health in Tobruk had remained high; hospital admissions, including wounded, remained below 2 per cent of the force per week, except when unusually large numbers of casualties caused a sudden temporary peak in the rate. Hygiene, after an early uphill struggle, was established, and kept up to a high level, though it was not possible to eliminate entirely all the insect pests which annoyed the inhabitants of billets and shelters. Prevalent diseases were infected sores, largely due to water shortages; dysentery which was common, though of mild type; infective hepatitis latterly increasing in incidence; relapsing fever carried by ticks; obscure pyrexias, which will be further considered in the next chapter, and nervous disorders. Psychiatric troubles, principally fear and anxiety states, at times caused some concern and measures were taken to deal with them very early, and to return men to duty promptly when this was indicated as the correct treatment. All the military measures necessary to maintain the morale of the force, and therefore to reduce psychological disorders to a minimum, were a major consideration from the earliest days of the siege. An active and aggressive spirit was cultivated in the troops, even during the too frequent air raids. After one trial the warning siren was banned, as its effect was the opposite to that desired. Good and resolute leadership banded the men together, their conditions were made as comfortable as circumstances permitted, rations were good and plentiful, neither communication nor munitions ever failed, mails were regular, and such amenities as could be safely permitted were provided. Loss of weight was common, but fatigue of body and mind were often due rather to inaction than to overstrain. Undoubtedly the defenders of Tobruk were under tension, but psychological factors were more important than physical wear and tear. Men who missed a mail from home would feel their

enforced isolation keenly, especially at times when a passive role was enforced by circumstance. The failure of operation "Battleaxe" to gain its objective depressed them temporarily, mainly because the advance stopped at Salum. Undoubtedly tension was felt by the defenders of Tobruk; in their defence they knew they were on top, but they were not free, though their spirit was undaunted.

Pamphlets dropped by the enemy suggesting the surrender of the garrison were regarded with derision, as showing very poor insight. By the beginning of September there were evidences of increased enemy activity: on the first day of the month 140 dive-bombers and high level bombers attacked the perimeter, for the advent of the Poles was doubtless known to the enemy. The time for a decision on the question of relief for the 9th Division was at hand. Several senior officers had been on brief leave, chiefly due to indisposition, and had discussed this at headquarters. Furnell wrote of the men that

Their morale remained as high as ever, but they became more easily fatigued and required longer to recover from effort. This was noted and reported on by all R.M.Os. The hospital staff found that patients were slower in recovering from minor illnesses. It was felt that the troops would not be in first class condition for any sustained effort or strain.

However, there is reason to believe that this opinion would have been modified had any offensive action been on the horizon. Similarly, Lieut-Colonel G. G. L. Stening commanding the 2/11th A.G.H. in Alexandria remarked that

Among Australian units after eight months' service an increase is noticed in desert sores, jaundice, relapsing fever, and general debility and weakness.

This opinion of course, refers only to the condition of men sent to hospital, and not to intrinsic physical deterioration. The greater prevalence of seasonal disease, particularly hepatitis and relapsing fever will be also noted: one battalion lost one-third of its officer strength from infective hepatitis alone.

At a conference held in Cairo on 10th September there were some differences of opinion from the military point of view, but the Australian arguments finally prevailed, and plans were made for the relief of the garrison by the 6th British Division then in Syria. During September medical work went on much as before. Polish field ambulances arrived; one of these relieved the 2/5th Australian Field Ambulance, which had been running the docks hospital. Before relinquishing this work Green urged that better ventilation be installed to cope with greater numbers expected in the future with arriving and departing troops, and to permit holding patients longer as the town hospital had been severely bombed. The promptness with which this was done, together with the provision of more wharfage space and the arrival of the Poles made it clear to the beleaguered troops that their relief was at hand.

WORK OF MEDICAL UNITS

It is convenient here to traverse briefly some of the activities of the medical units in Tobruk during this latter phase of the siege.

Regimental Medical Officers performed outstanding work in Tobruk. Without the initial advantages of the R.M.Os. of the 6th Division, they had been through the brief school of a hurried retreat, and then took up duty within a thirty miles perimeter. Here they carried out all types of work, from first aid to the running of miniature hospitals in caves or dug-outs. Encouraged by a resolute command and an understanding administration, they were given opportunities of keeping themselves professionally keen, and later on drew up appreciations of the work of an R.M.O. and discussed these with the A.D.M.S. They worked in close contact and collaboration with the sections of field ambulances. Some of the R.A.P. sites were relatively exposed, even digging was difficult in this stony ground, and evacuations from some of these were hazardous even with the protection of the Red Cross. Others made use of some of the underground caves which were a feature of Tobruk, and here men with fear or anxiety states or mild ailments could be kept for a day or two for rest and care after which they might resume duty. Quite capacious caverns were used at Figtree and Bianca, and in the Indian Cavalry R.A.P. in Wadi Sehel. One of the best known was Figtree, a leafy landmark growing over a deep cavern in an ancient cemetery in the middle of miles of barren country. Here the headquarters section of the R.A.P. could look after men for four to five days, giving them a wash, clean clothes and sleep: most of these were able to return to their unit.

Though the cavern was within range of enemy fire and shelled at times, it was safe, and provided an aid post, a room for stretcher cases, and small kitchen and a little space for the R.M.O. to sleep. It had air vents which gave enough natural light, and at night lamps could be used. Transport linked it with the battalion headquarters, though by day the trip was dangerous and used only in emergency when the truck flew a conspicuous flag. A responsible N.C.O. would give morphine, and at least one stretcher bearer could apply dressings and use simple drugs. The R.M.O. Captain S. J. M. Goulston, visited at least one post each day. Epidemics of mild diarrhoea soon subsided by simple treatment, the space available being used to hold men for a day or two if necessary. The value of early preventive treatment was evident in the results obtained, and reflected well on the maintaining of a good standard of health of body and mind. Not all R.A.Ps. had the advantage of so good a treatment centre, but the same principles were observed in all forward unit aid posts. The treatment of early neuroses was particularly effective in the front line. Here it was possible for the R.M.Os. to observe any men who were becoming "jittery" and likely to spread fears to others: if sleep and rest rehabilitated them they went back to work; if not, they were sent to a medical unit, from which it was unlikely that they would return to duty. A feature of the chain of medical work in Tobruk was the closeness of the nexus between its components; of these the R.M.Os. reached a high standard, and carried preventive medicine into the zone of battle.

Field Ambulances. The main body of the 2/3rd Field Ambulance had worked in the Wadi Auda, and dealt promptly with many acute nervous

exhaustion states, usefully employing some of these in making shelters. Mobile sections served the forward battalions, and during the August attack excellent work was done in recovery of casualties. Even up to the middle of June 1,000 patients had passed through the M.D.S., exclusive of those seen in sick parades. Arrangements were also made for a resuscitation team to go forward to work with fighting patrols, but this was not needed. During September courses were begun in nursing procedures and first aid. The 2/5th Field Ambulance moved to the Wadi Auda soon after its arrival, not without interruption, as their convoy was subjected to dive-bombing during the move, fortunately without casualties. Mobile sections were organised with the 2/9th, 2/10th and 2/12th Battalions, maintaining close touch with the R.M.Os. During the May assault on the area the ambulance was very busy collecting and attending to casualties. The unit commander, Lieut-Colonel Green, was in charge of the collection of wounded in areas covered by both the 2/3rd and 2/5th Ambulances. Some of the carries were very long for the stretcher bearers, who found it was better to take patients out under enemy observation than to use a rough alternative route two miles long. At the end of May some of the evacuations for the 18th Brigade were very hazardous; one route was under machine-gun fire, and the other along a wadi impassable at night. It was found better to use a motor ambulance at night over the top of the wadi. In July the ambulance took over the docks evacuation hospital, and worked out standard methods, which were followed by relieving units.

The 2/8th Field Ambulance during the early attack on the perimeter supplied mobile sections, and controlled others from the 2/3rd and 2/11th Ambulances, and also set up advanced dressing stations. One section established contact with a forward post made by the R.M.O. of the 2/32nd Battalion almost within the minefield. One company moved to the beach, and the M.D.S. at first in old diggings near the escarpment was later moved to limestone tunnels. On a number of occasions this unit was threatened by bombing raids and artillery fire; one ambulance waggon near a mobile section was directly hit, injuring several men, and early in May the M.D.S. was bombed and machine-gunned by a formation of thirty planes, several men being killed and tents and vehicles damaged. In spite of large red crosses made from ground sheets the M.D.S. was again attacked on 28th May with five bombs, two of which fortunately did not explode. During the German attack in August some difficulties were found in the coordinating arrangements, as vehicles were insufficient, but patients were moved by ambulances from another unit. As has been already told, the Germans cooperated well here in permitting collection of wounded. On 21st August the unit took over the docks hospital from 2/5th Field Ambulance.

The routines had been clearly worked out for evacuation by naval ships. Patients arrived from the 2/4th A.G.H. between 1400 and 1900 hours, and were bedded and fed, pending arrival of destroyers. The navy informed the commander of the docks hospital when the ship was sighted, and lying patients were put on stretchers on a barge with an unloading party, which tied up to the destroyer and lifted the stretchers on board.

On moonlight nights bombing and mine-laying were frequent, and made the task even more hazardous. Early in September air raids were severe, and one officer was killed at the door of the 2/8th Field Ambulance officers' mess. The unit handed over to the 173rd British Field Ambulance in October; unfortunately during embarkation a lorry loaded on a lighter was lost with a quantity of heavy gear and office records.

The 2/11th Field Ambulance had begun collecting casualties with sections soon after arrival, and had established an M.D.S. which was soon moved to a more protected site in a wadi, with sandbagged dug-outs. The M.D.S. was rather near the inner defences; this and the A.D.S. which had been established were closed. A rear portion of the unit was in a camp at the beach, where thermos bombs were dropped during a raid in June. On 24th July the ambulance took over the Sidi Mahmud hospital from the 2/2nd C.C.S., this became the site of the M.D.S. of the unit. The numbers of patients increased each month as the time of full moon approached, when sea evacuation of sick and wounded was temporarily suspended. During August, 655 patients passed through the M.D.S. and 180 through the hospital. During the later period bombing attacks were made on the area, and though on one occasion rock was loosened at the entrance of the tunnel to the M.D.S. no casualties occurred. The unit handed over to the 189th British Field Ambulance.

The 2/2nd Australian Casualty Clearing Station. This unit, seriously handicapped by loss of equipment made many valuable contributions to the medical work of Tobruk, though unable to share in the final phase. Its pioneer hospital work after the fall of Tobruk fortress, continued at Barce, its establishment of a hospital at the docks, and of a medical centre in the caves of Sidi Mahmud have been already described. In addition its staff supplied surgical teams and gave great help to the 2/4th A.G.H.

The 2/4th Australian General Hospital was faced with difficulties from the beginning. After surviving shipwreck, though actually saving the equipment, the unit was moved from Tobruk to Barce, and then hastily back to Tobruk with the loss of some material. Nurses joined the unit opportunely, as rapid expansion from the Italian barracks building necessitated the opening of a section on the beach, but a few days later safety demanded their withdrawal. Without the help of the 2/2nd C.C.S. and the 2/3rd Field Ambulance the tasks thus imposed on the staff would have been almost insuperable. Following on the disastrous dive-bombing on 10th April when two officers, two men and numbers of patients were killed in the 2/4th A.G.H., air attacks became frequent. In the six months that this hospital worked in Tobruk forty-seven bombs were dropped on the hospital area, not counting incendiaries, attacks on the beach area or machine-gunning. Better and bigger red crosses gave the beach hospital more protection, and the provision of dug-outs and shelters increased its safety: the main hospital could hardly expect immunity in the town area, though a complaint was made on one occasion of the proximity of ammunition dumps. The early necessity for abandoning hospital ships for small naval ships for transport of sick and wounded, and for housing patients in

shelters at the docks and at Sidi Mahmud, forced on the hospital the virtual role of a C.C.S. As much of the work done was of a major type this cast great burdens on the medical staff. This work will be described in the next chapter. Admirable work was done by the orderlies; only one highly trained theatre assistant was available when the nurses left. In June Colonel Speirs asked for the return of the nurses to Tobruk arguing that their value was of much greater importance than the risk of injury or capture, but General Morshead could not grant this request. Speirs with special insistence pointed out in subsequent reports the great loss felt when a hospital loses its nurses. The staff of the hospital was augmented by detachments from all the field ambulances, usually one medical officer and eight N.C.Os. but this did not make up for the absence of highly skilled nurses. He felt that even the return of a small group of specialist nurses, for theatre work and ward supervision would have been invaluable. He further held that the question of personal risk was weighed too heavily in the scales, even had they been taken prisoner. In other sections of this volume the other side of the picture will be seen.

Connected with this subject is that of training of orderlies. A remarkable standard of efficiency and trustworthiness was attained by numbers of these men, some of whom had no previous training, but the need for more men with some degree of knowledge and capacity for medical work under supervision was evident. Speirs disagreed with the maxim that such men are to be made "soldiers first and specialists afterwards" and criticised both the pace of the training in A.A.M.C. training units and the poor quality of reinforcements arriving in Tobruk.

Much special work was done at the 2/4th A.G.H., not only in the medical and surgical divisions, but also in the special departments. The unit fortunately possessed both staff with special knowledge and the appropriate equipment for orthopaedic work, as the familiar types of the "Tobruk plaster" bear witness. Relapsing fever was investigated in the area by Major Rudd who also tried to elucidate certain unidentified pyrexias, and carried out all pathological routines. The presence of an ophthalmologist ensured that prompt treatment was carried out on all acute eye conditions. Though hampered by shortages the X-ray department was able to meet all ordinary demands, using the standard unit for general purposes and a portable unit. It was necessary to ensure that films transported by sea to and from Egypt should be packed in watertight metal cases and protected from heat. The value of electric generators was underlined in Tobruk. The only generator on the War Equipment Table of the 2/4th Hospital was one of 2½ horsepower which was quite inadequate. Two 25 K.V.A. generators were taken to Tobruk, and did excellent service in underground wards and in X-ray work.

Hygiene. References have been made to hygiene in several places. The shortage of water was troublesome; in the front line men often had only the contents of one water-bottle a day for washing, drinking, and shaving and cleaning teeth if they performed these rites. Sea bathing was possible when they were out of the line, and sea water was taken in oil drums to

forward posts. Exposure of the body to the sun was helpful, particularly in keeping down ectoparasites. Cooking was usually centralised, and every effort was made to give the men hot meals. The disposal of excreta and refuse was difficult. Fryberg and his 2/4th Field Hygiene Unit gave constant personal and mechanical assistance and were insistent on high standards. A latrine was devised which could be moved when the used site was filled up. Tins and spare food were burned or buried if possible. Occasional mutual recriminations were heard when one unit took over from another; perhaps even virtuous denials did good on both sides. The whole medical administration of Tobruk laid emphasis on hygiene, and undoubted success was achieved.

The method of sea evacuations has already been described: a few more notes complete the picture. The men faced a comparatively brief journey to Alexandria, usually about fourteen hours, but one made under tension and with only moderate comfort. After July the R.A.N. "V" class destroyers and *Stuart* were replaced by "H" and "D" types which had better accommodation for stretchers. Two destroyers were sunk, *Waterhen* and *Defender*: neither was carrying patients at the time. From August the large "J", "K" and "N" class destroyers were used, and as a rule two large and one "H" or "D" types would call, the latter using a jetty opposite the docks hospital. A self-propelled barge was acquired in July, independent of tugs and holding forty-five stretchers and thirty walking wounded and was most successful. Six to ten bearers loaded the stretchers, often having to lift them to a height of six feet. After August more aircraft came over on bright nights, and it became necessary to risk overcrowding of hospitals and wait for the darker periods. On occasion it was thought best to hasten loading even while an aircraft was circling before releasing bombs. The most important duty was to get the ship into the stream, however regrettable it was to make helpless men face danger. It sometimes happened that the harbour was illuminated with flares and bombarded both before and after an embarkation. The stretcher bearers showed great devotion and fortitude: 37 stretcher cases, 33 walking and the kits of these men and 100 other invalids have been loaded in twelve minutes in darkness.

Either the A.D.M.S. or the D.A.D.M.S. was present at each embarkation and acted as embarkation medical officer. In the light of naval information he coordinated loading in from the docks hospital to the ship, and took the nominal rolls to the ship's medical officer. He later signalled the number and categories of invalids to Matruh or Alexandria. On one occasion in July while patients were being evacuated during the early hours of the morning the tug towing the lighter broke down, and they were drifting towards the boom and the harbour mouth. Shelling was taking place at the time and a volunteer, Private D. Green, swam to the shore and obtained another tug. The evacuation then proceeded without incident.

Numbers evacuated by sea were as follows: by hospital ship February 1,482, March 1,076, and in the next two months including the period of

investment of Tobruk, April 1,637 and May 167: by destroyer 9,235, together with 1,013 prisoners of war, 62 prisoners also being evacuated by another ship. During the period April-October 10,248 patients were safely transported by sea from Tobruk. There can be no question that this accomplishment was one of high order, demanding coordination, resource and determination. The effect of this prompt and safe evacuation of sick and wounded without doubt must have been most stimulating to the morale of the troops.

RELIEF OF THE GARRISON

The first medical unit to leave in the general relief of the garrison was the 2/5th Field Ambulance on 23rd August, but the 9th Divisional units only began to depart during the dark of the moon in September. During this month infective hepatitis became much more prevalent; it was a possible cause of some of the undetermined pyrexias, as jaundice only appeared after a latent period, diphtheria appeared too occasionally and dysentery was then lessening in amount and was not of a toxic type. Colonels James and Smith, British Consultants in Psychiatry and Tropical Diseases visited the area on 18th September, and were most encouraging and helpful.

On 21st September the 2/3rd Field Ambulance left Tobruk, but the remainder of the medical units stayed till October, when conditions for embarkation were again favourable. The 2/11th Field Ambulance embarked on 20th October, and the 2/8th on 21st October. The beach hospital was attacked on 10th October with incendiaries and a high explosive bomb which was fortunately a "dud". A week before Colonel Speirs handed over to the 62nd British General Hospital, a shell from "Bardia Bill" landed on the steps of Ward 3 as a parting gesture; luckily no damage was done. On 22nd October "The main body of the 2/4th Australian General Hospital left Tobruk without one backward glance". The last movements of October involved the lifting of two brigades each way; the plan was carried out successfully, but the last load was turned back by an air attack, and on account of the growing brightness of the moonlight Brigadier Murray, commanding 20th Infantry Brigade, part of the 2/15th Battalion and the 2/13th Battalion had to remain. Some weeks later the commander and the 2/15th Battalion were brought out, but the 2/13th Battalion stayed and fought with distinction till November, having the satisfaction of leaving in the middle of December by road. No evidence of appreciable extra strain was observed in this formation during the remainder of its stay in Tobruk and it played an important part in the final successful engagement.

There is no doubt that the months of arduous service in Tobruk imposed wear and tear on the defenders, but perhaps too much has been made of their physical deterioration. General Blamey in a letter to General Auchinleck, Commander-in-Chief Middle East, spoke of "the great decline in the physical condition of the troops holding Tobruk" in July, and in September of the endangering of the safety of the fortress which might

have occurred had the enemy made a strong attack. Major-General R. M. Downes Inspector-General of the Australian Medical Services was also quoted as saying that few of the men "would be able to march eight miles". It would be difficult to sustain these statements as being free from exaggeration. On the other hand R.M.Os. who lived with the men considered that Australian troops were always superior to the enemy, and that, although there appeared to be some lessening of resistance to disease, there was no physical deterioration amongst the men. The problem was really more military than medical, and its psychological aspects would not be missed by any experienced commander or medical officer. It is a pity that it ever became a political issue.

There is however no doubt that after the severe trials of Tobruk it was most advantageous for the 9th Division to have a period of rest and reunion with its parent corps and to begin training for its next duty. After that initial period of "let-down" familiar after sustained strain they soon recovered their depleted strength and energy.

The medical services did much towards the successful holding of Tobruk. The preliminary work on that defiled area, the establishment of adequate hygiene, the emphasis laid on the prevention of disease both of body and mind, and the high standard of clinical work, equal to that carried out anywhere in the Middle East, were worthy of the men who did the real work.

CHAPTER 11

MEDICAL CONDITIONS IN THE WESTERN DESERT AND TOBRUK

CONSIDERATION of the medical and surgical conditions encountered by Australian forces in the campaign of 1940-1941 in the Western Desert and during the siege of Tobruk embraces the various diseases met and the nature of surgical work performed. In addition it must include some assessment of the general health of the men, which does not mean merely the absence of demonstrable disease. Matters relating to organisation are more appropriately dealt with in a later chapter in which the lessons of the experiences in the Middle East are examined. As told in Chapter 7, the forward surgical work was done in a main dressing station during the battles of Bardia and Tobruk. It is admitted that a serious difficulty of this arrangement was that men had to be held for some time in the M.D.S., which put a brake on the movements of the field ambulance, especially as only the most severely wounded men were operated on in the M.D.S. as a rule, the others being sent to a casualty clearing station at least 150 miles away. Dispersal of the tents multiplied the work of the staff considerably.

SURGICAL CONDITIONS IN THE DESERT

Though battle casualties were not numerous, the value of being able to deal with varied types of wounds was apparent. In the Bardia and Tobruk actions abdominal wounds were few. Major J. O. Smith had emphasised features which were found of the utmost importance in later campaigns, in particular the degree of blood loss common in these injuries, and the frequent association of severe injuries of the abdominal viscera with wounds of entry in unusual places. The source of bleeding was difficult to discover, more important was the search for perforations of the bowel, which were easy to find. In the 2/1st C.C.S. at Mersa Matruh 352 battle casualties were treated: of these only three had penetrating wounds of the abdomen, six penetrating wounds of the thorax, three head injuries; the remainder of injuries in these regions were superficial only. By contrast, there were 249 wounds of limbs, including fractures and those requiring amputation. The shortest period between wounding and arrival at the C.C.S. was thirty-six hours, the longest four days: of course all these patients had received prompt treatment forward. Most of them showed considerable degrees of shock, due to the long trying journey on a bad road. Through and through bullet wounds gave trouble only when they had been plugged with gauze: fortunately this was seldom done. Grenade wounds were seldom serious, unless they involved the eyes. Lacerated wounds usually did well after adequate early treatment. Very few amputations were necessary; they did well if the flaps were loosely approximated. Haemothorax was found in all the chest wounds; some had attained

stabilisation. Though few abdominal wounds were seen it is significant that all the patients were shocked on arrival, and all suffered from ileus. Thus early was it established in this campaign of long distances that men with penetrating wounds of the abdomen travelled badly. Compound fractures constituted a major problem. The long journey by ambulance was a nightmare to these men, and, owing to the fact that fixed extension by a hitch round the boot had usually been employed, pressure sores were common. The men treated with plaster over voluminous dressings were relatively comfortable: this was also noted at the 2/2nd A.G.H. at Kantara. The necessity for immobilisation of fractures was thus stressed at the beginning of this campaign.

The practical detail of washing and feeding all patients as soon as possible after arrival, and, if practicable, shaving them also, was found most important. The frequency of wounds of the lower limbs in the desert had been expected, owing mainly to the prevalence of mines and booby traps, whose firing mechanism was usually well concealed. The "thermos" bomb, so called from its shape, contained a cap and detonator powerful enough to damage limbs, and its explosive charge was effective up to 100 yards, large fragments often flying up to 300 yards. The freedom from infection of wounds received in the desert has already been remarked: no clinical gas gangrene was seen. Major E. S. J. King's observation may again be noted here, that some of the wounds of Italian prisoners which had had practically no treatment remained uninfected.

The technical experience at Bardia was repeated during the battle of Tobruk, but here the period was shorter and the medical preparations more extensive, so that fewer difficulties were encountered. As the forces rushed forward to Benghazi and beyond, there was, fortunately, less urgent surgery to be done. A point of importance remarked by Colonel Johnston, D.D.M.S., 1 Australian Corps, was that the casualties in Cyrenaica were serious in nature rather than numerous, and were due chiefly to the growing air attacks, mainly dive-bombing and machine-gunning from *Messerschmitts*, and spasmodic attacks of armoured vehicles on forward posts. Blood transfusion in these dispersed actions was carried out successfully without a centralised organisation, largely owing to the policy of General Burston that all forward medical officers should be expert in this work, and to the influence and teaching of Major Ian Wood. In the 2/4th A.G.H. in Tobruk blood was stored in an ice chest; some trouble was experienced with contamination of citrate tablets by the *subtilis* group, and great care was necessary to avoid this, as there was lack of running water to wash glassware. Minor technical defects in the apparatus could cause air-borne contamination, but in spite of unfavourable surroundings and limited facilities, the use of blood transfusion was not hampered. The Julian Smith direct transfusion apparatus was used with success in suitable cases. Similarly there was a feeling that anaesthesia was best left to people on the spot, under supervision of a surgical team, and that the specialist anaesthetists were of most value in general hospitals. The value of a skilled anaesthetist was of course fully appreciated.

Early in 1941 a conference was held at which surgical representatives of British and Dominion forces were present; at this the main problems concerning treatment of surgical conditions were discussed. There was general agreement that the most important matters were the provision of early surgical treatment for all wounded, and special facilities for the treatment of orthopaedic conditions, wounds of the head and the chest and facio-maxillary injuries. The latter were provided at special centres to which men were transferred when fit to travel. Concerning early treatment, no panacea could then be offered for those wounds needing prompt operation which, particularly in abdominal injuries, demanded that the patient should be held for some days. Since no general principles could be laid down it was apparent that prevailing conditions must be a deciding factor. Mobile surgical units were discussed, but weak points were recognised in the need of transport in a place and at a time when all transport was scarce, and also in the depletion of skilled surgical staff from base units just when their need was greatest.

SURGERY IN TOBRUK

Medical and surgical conditions during the siege of Tobruk differed from those prevailing elsewhere. The 2/4th A.G.H. though working under conditions of strain, was adequately equipped for most types of surgical work. The majority of surgical cases reached hospital within six hours of wounding; some of the men with urgent conditions, including abdominal injuries, arrived even earlier. Patients with abdominal wounds usually recovered if they survived long enough to be sent to the base. As the months went by in Tobruk results from abdominal wounds deteriorated, owing possibly to a greater dehydration of patients, before being wounded, and to lessened resistance from general causes. Chest wounds were relatively common, and the principle was established that the pleural cavity should be kept dry. It was often noticed that some fever occurred during the second week; this was thought to be due to infection round a foreign body, and was regarded as an indication for surgery, but further deliberate procedures were not carried out in Tobruk. Collapse of the lung *per se* did not foreshadow a bad prognosis; it was better to find air than blood in the pleural cavity. Injuries of the upper lobe did better than wounds of the lower lobe, owing to the greater ease with which rest and drainage were obtained.

Burns were fairly frequent of occurrence, and usually of second degree. An occasional cause of burns was the incautious use of petrol. Men sometimes wet a flea-infested dug-out with petrol and threw in a match, a practice which often had serious results. Tanning with tannic acid and silver nitrate had good results on the whole, provided the usual precautions were taken on special sites, but patients with burns often arrived at the base in poor condition. This was attributed to a need of further skilled treatment at the time of evacuation, a condition hard to fulfil in Tobruk.

Injuries of the limbs were some of the most important treated there, on account of the problems arising in transport, especially when the wound involved long bones of the larger joints. Fractures of the femur raised all the usual problems. Thomas splints were regarded as ideal for transport from the aid post to the main dressing station or C.C.S., but some of the splints supplied were faulty in the design of the ring, which was often nearly circular and did not have the correct perineal depression. Adequate support of the back of the thigh was sometimes lacking. Extension with the use of a clove hitch was found unsuitable and uncomfortable: a bandage threaded through the slit boot was found useful. Warnings were given of the risks of packing under the ring of the splint over the femoral triangle. The commonest fault in the application of Thomas splints at aid posts was neglect of suspension, which caused angulation of the femur. At the 2/4th A.G.H. full advantage was taken of the facilities which existed for plastering, and the "Tobruk plaster" and its modifications adopted there met the need for immobilisation. The Tobruk plaster was simply a full plaster case incorporating a Thomas splint without extension. If the Thomas splint did not fit well a plaster spica was found preferable, in spite of difficulties in applying it and the possibility of pressure sores. Shoulders were at first treated with a plaster shell over the shoulder and under the arm, with the latter secured to the side, but later, after further experience, a spica was used with the arm abducted to 40 degrees. It was indeed some time before the lesson was learnt that such injuries call for methods that will be effective under the worst conditions of transportation. During the period April to September 1941, eighty-seven major amputations were performed in Tobruk, most of them immediate. The usual practice was followed of making flaps equal to the diameter of the limb. Sutures were inserted at only one or two points and nerves were not shortened or tied. Most of the wounds healed without serious sepsis.

Some extemporisation was necessary: in July a survey of the surgical equipment of the 2/2nd C.C.S. showed deficiencies, especially in heavier items, but these were made good from stocks of captured instruments, and a foot suction pump and a Bohler traction frame were devised by the ordnance workshops.

Considerable mortality followed wounds of the head, the death rate was 50 per cent where penetration of the dura had occurred. In consonance with usual experience, the degree of loss of consciousness was found a good guide to the seriousness of a head wound. Sometimes the cause of death was obscure; in some instances it was thought possibly to be due to microscopic damage to the brain, particularly in the basal part.

Dental Conditions. Major A. B. P. Amies made a special report on all dental conditions encountered in Cyrenaica and Tobruk. He found many men were completely edentulous; some of them had been without dentures for as long as nine months, and though many complained of indigestion others were quite fit. The gums were usually healthy. The incidence of caries was not great; it appeared to be somewhat less than might be expected in a similar body of men under ordinary conditions. Amies

noted a number of men with impacted teeth, and suggested that men with these conditions should not be sent into forward areas, but Colonel Down, A.D.M.S., Dental, doubted the validity of this view, and also pointed out that there were not many edentulous men in the 6th Division, as only 50 had been observed out of 1,350 to have full dentures. Fractures of the lower jaw were not easy to control during the journey from Tobruk to Egypt. Amies reported that some men arrived at the base with wiring loose or even unfastened, but nevertheless, he recommended that wiring should be applied loosely in the interest of safety, as sea sickness was a genuine hazard on a small ship where close attention was difficult to give to individual patients.

Anaesthetics of the usual type were used. As pointed out elsewhere, ether was of general utility, and "Pentothal" was found of particular value in Tobruk, due regard being paid to the precautions for securing a free airway. Gas anaesthetics were used to some extent too, but difficulty was found in obtaining gas cylinders of the Australian type, as those in the store were of British type. Major Trethowan, on an official visit to the area, suggested that adaptors could be made to overcome this.

Affections of the ear, nose and throat were not common. Perforations of the ear drum from blast were relatively common in all the actions in Libya and Cyrenaica; they were often bilateral, and occasionally multiple, and their size sometimes prevented complete healing. Hearing was not usually much impaired. *Otitis externa* was not uncommonly seen in Tobruk; it was only satisfactorily treated in hospital.

Eye injuries have been already mentioned in the previous chapter. They were usually an indication for return of the patients to Egypt. Though a giant magnet was among the equipment in Tobruk it was useless, for although most of the injuries were due to metallic particles, these were usually non-magnetic. Trachoma was almost universal in the native troops, but was not seen in others. Night blindness was seldom proved to exist. Conjunctivitis was remarkably uncommon, in spite of dust and glare and paucity of convenience for washing. Refractions were carried out in Tobruk; over 300 prescriptions for glasses were sent to Egypt, but only 67 pairs of glasses materialised.

"*Desert*" sores were not infrequent among the forces in Libya and Cyrenaica and they appeared in proportion to the lack of washing facilities especially after several months. In Tobruk infections of the areolar tissue were often seen, sometimes associated with fever and involvement of the lymphatic glands. These lesions would no longer respond to occlusive dressings. Dermatological conditions other than those of minor grade as a rule did not lend themselves to treatment except in base areas. Scabies needed some degree of control in Tobruk. This applied particularly to prisoners of war, but the conditions of living in the line might easily have favoured parasitic infestations, and disinfestors were installed and used where necessary.

Swimming was of course a pleasant and most useful prophylactic amenity for men out of the line for rest, but the difficulty was one of

distance. In Tobruk the privilege was curtailed during the later months by reason of petrol shortage. An interesting link with the past is the name "Anzac Cove", which was given to a beach where occasionally men swam in the evenings.

Analysis of the battle casualties showed the following figures during 1940-1941:

Campaign	Killed in Action	Died of Wounds	Total	Wounded	Missing	PW	Full Total
<i>Libya</i> 19th Dec 1940- 31st Mar 1941	209	59	268	932	—	24	1224
<i>Cyrenaica and Tobruk</i> (retirement and siege) 1st Apr 1941- 18th Nov 1941	567	199	766	2057	4	973	3800

MEDICAL CONDITIONS

The medical diseases most frequently encountered in the Western Desert and in Tobruk were important from the preventive aspect, as most of them could be reduced in incidence by appropriate measures, without which greater depletions of the force might have occurred.

Dysentery was the most obvious danger, particularly when the approach of warmer weather brought an increase in the fly population. As has been pointed out already, the conditions of dispersal in the desert, and the scarcity of wood and other material for construction of latrines where the nature of the soil made this possible, militated against a high sanitary standard in some respects. Colonel Johnston commented on the unsatisfactory hygiene in places where it was difficult to enforce. Fortunately, however, sickness from this cause was neither extensive nor severe, and, as we have seen, when the 9th Division was concentrated in Tobruk, the intrinsic dangers of large numbers of mixed races living in a restricted area were offset by the hard and persistent work of the hygiene services, and no severe epidemic occurred. The introduction and supplying of a latrine box to forward areas by Major Fryberg and his hygiene staff was of great prophylactic value. Nevertheless, both in the desert and in Tobruk the risks of dysentery were increased by the presence of a large population of native labourers and inhabitants, and of many prisoners of war, all of whom were potential carriers. Major Mackerras in a study of the fly problem in the desert noted that flies were numerous even early in the year, and so persistent that it was very hard to exclude them from food and drink. A desert fly, *Musca sorbens* had habits as noxious as those of the domestic housefly, and by April was increasing rapidly. Mackerras recommended that an officer with knowledge, facilities and assistance

needed for entomological and bacteriological work should study the whole problem from the point of view of prophylaxis. He further recommended that all men with presumed dysentery should be detached from the fighting force, that all refuse be incinerated if possible, or dug in daily, and that borax or other insecticide be sprinkled on the site and other possible breeding grounds, and that excreta should be incinerated if possible, and all appliances be rendered fly proof. Special precautions were necessary in cookhouses, and disinfectants were provided for cleaning the hands of those preparing food. Finally, native labourers required special care, and local inhabitants should not be allowed to return to territory likely to be occupied by troops. Figures collected by Major Blair of the XIII Corps are of interest. He found the weekly rates for dysentery to vary with the nature and mobility of troop formations, as follows: Armoured division 0.46 per 1,000; stationary troops in Matruh fortress with many natives near, 0.51 per 1,000; N.Z. brigade groups, well dispersed in stationary position, 0.73 per 1,000; corps troops in small units with no permanent supervision, 3.0 per 1,000; British troops in motorised division, mostly separate, but with little experience in hygiene, 3.3 per 1,000; and Indian troops with poor hygiene, 5.4 per 1,000.

Dispersion, tightened control, the adoption of better individual methods, and, later, rapid movement were probable factors in keeping dysentery in bounds during the open campaigning in the desert. In Tobruk the application of sound methods and constant supervision, and the placing of responsibility on the units themselves reduced fly breeding, and kept dysenteric disorders within bounds. A factor of great educative value was the close personal supervision of unit hygiene by experienced N.C.Os. from the 2/4th Field Hygiene Section, who lived for periods with the troops in forward posts.

Of all the infectious diseases notified for the whole of the troops in Tobruk during the period from April to October by far the greatest number were due to diarrhoeal infections; 1,106 cases were notified under the categories of dysentery, diarrhoea and enteritis. Most of the infections were of Flexner type, with only a few of the Shiga variety; toxic symptoms were seldom severe. In some patients with clinical dysentery no organisms were demonstrable. Water was not usually suspected as a source of dysentery in Tobruk, but some cases were thought to follow the drinking of good water collected in dirty water-bottles. It was considered that many mild infections were transmitted by handling contaminated food. Most of the hospital staff were affected with mild attacks at one time, but compulsory washing in antiseptic lotion before handling food was found effective as a preventive. Sulphaguanidine was available only in limited quantities in Tobruk for part of the time, but proved of value, especially in shortening the course of the disease.

Amoebiasis was not a significant problem during these campaigns: no doubt, as in other areas, stealthy infections sometimes occurred, which became manifest at a later date.

FEBRILE DISEASES

The incidence of infective hepatitis began to increase in the later months in Tobruk, and caused considerable loss of time from duty. Little was known in 1941 with any certainty about this infection. Some medical officers had a suspicion, confirmed later, as we now know, that it was epidemiologically of the intestinal group of infections, but others clung to the hypothesis of spread from the respiratory tract. As there is no doubt a good deal still to be added to knowledge of its natural history, there is little more that can be said here. One other point is, however, dealt with further in connection with causes of obscure pyrexia. It is worth noting that in the more severely affected patients, with acute onset of symptoms, neck rigidity was not uncommon.

Relapsing fever was another problem to be dealt with in Tobruk. The disease as seen in the desert was of the same type as seen in Palestine and Syria; it was transmitted by ticks, apparently of the *Ixodes* variety. The louse-borne variety was not seen. Lieut-Colonel E. L. Cooper investigated the disease clinically in Tobruk and Major G. V. Rudd carried out the pathological diagnostic work. It is likely that, in spite of careful and skilful investigations, a diagnosis was not always possible during the time available. In the following months men were occasionally seen in general hospitals in Palestine with neurological complications of relapsing fever which had not been previously recognised. The spirochaete is not easy to demonstrate, and sometimes can be found only by special methods, such as animal inoculation. The history is often misleading too, as it is not at all obvious to the victim that he has been bitten by adult or larval ticks. Prophylaxis was difficult both in the desert and in Tobruk, where the haunts of the ticks, such as dug-outs, tunnels, caves and crevices in rocks were just the places where men sheltered and even lived. As was found in other centres, arsenic did not give striking results in treatment.

Undetermined Pyrexias. In Tobruk there were large numbers of cases seen of pyrexial illness for which no sure explanation could be given. There was little opportunity for elucidating pyrexial diseases except in medical units able to hold patients for some length of time. This general question has been discussed already. In Tobruk the nature of these infections seemed to change as time went on. In May the illness resembled sandfly fever or dengue fever. Rashes were rare, and the duration was brief, though the toxic symptoms caused considerable temporary disturbance. Frontal headache was common, also occipital or sub-occipital pain, pain behind the eyes with tenderness of the eyeballs, and aching of the back and limbs. Lumbar puncture relieved the headache. It has been repeatedly stated that no sandflies or mosquitoes of the *Aedes* type were found in areas in which the disease appeared. Sandflies were certainly not absent from their characteristic haunts, though their numbers might not have been great; at Mersa Matruh the *phlebotomus* was recognised after careful search. Colonel S. Smith, British Consultant in Tropical Diseases, on visiting Tobruk, pointed out that it was highly probable that sandflies

were present there, even though they had not been detected, just as had happened in Matruh.

Another possible cause of confusion in diagnosis was infective hepatitis. An acute febrile onset was not infrequent, with a latent period before jaundice appeared; there was also a non-icteric variety of the disease. An even more important suggestion was that some of these fevers might be a variety of typhus fever. Rudd investigated this possibility, but could not demonstrate agglutination of the *Proteus* OXK, OX2 or OX19 at diagnostic levels. The 6th Mobile Bacteriological Laboratory reported finding immunological evidence that there was a variety of typhus in Tobruk thought to be of the murine type. Agglutination of *B. proteus* OXK, but not of OX19 or OX2 was found; this was not confirmed by other tests in the 2/4th A.G.H. Rudd found no organisms grew from blood cultures from these patients; the only abnormality on routine blood examination was some degree of lymphocytosis. It would not be surprising if cases of mild typhus were carried in Tobruk by an insect vector, either a flea or a tick. Subsequent work in other areas showed that a considerable amount of critical work was necessary to establish this diagnosis, and though pathological facilities were good in Tobruk, the opportunity for prolonged serial investigation was not great.

After some months the predominant nature of the common undetermined fevers changed: the upper respiratory tract was frequently affected, and a number of patients were seen with broncho-pneumonia. It is possible that some of these may have been due to the so-called "atypical" virus pneumonia, but this is merely an unconfirmed suggestion. With constant traffic in and out with reinforcements and patients it is possible that some new infection was introduced, such as the common "Urti" of military camps.

In some areas, particularly among the prisoners of war at Tobruk, fever and sweating were common, associated with pain in the muscles and joints severe enough to suggest a rheumatic affection. Some of these attacks were probably of the common variety described in Tobruk, but it is possible that others may have been more akin to conditions more or less vaguely described as "rheumatic". In January 1941 fever, malaise and joint pains were observed in a number of Australian soldiers; three were seen in one week in the 2/2nd Battalion. These attacks were associated with localised symptoms in one of the larger joints, which was usually hot and swollen. They were not related to the familiar bouts of "fibrositis" which may follow exposure to cold and exertion.

Malaria was only seen in a few instances among the forces in the desert: it was not endemic in the areas under consideration.

PSYCHIATRY

The only other important medical conditions belonged to the psychiatry group of disturbances. There are some local factors of importance which merit further consideration here. Physical exhaustion did not play so important a part in Tobruk as other factors, such as the existence of a

poor emotional background, illness, the consciousness of the lack of air support, and the non-success of the campaign from Egypt. To these must be added worry of domestic origin and lack of regular letters from home. Though acute exhaustion did not often play a dominant part in Tobruk, this did occur as a precipitating event. It was then rather the culminating crisis of a long period of fear-producing stimuli and lack of rest that produced the breakdown. Dive-bombing was a definite exciting cause, especially as retaliation in the air by fighters was not possible. This was seen particularly in anti-aircraft batteries where men broke down suddenly after prolonged exposure to such attacks. In these units the common primary reaction seen was exhaustion though some of the men also showed hysterical abreaction, running and calling out. A secondary reaction was more often seen in men with previous neuropathic tendencies. The acute states usually gave a better prognosis. It was noted that the neurotic conditions of more gradual onset occasionally became manifest while the man was under treatment in hospital, for more or less minor affections, such as mild dysentery. The percentages affected in the various units are of interest estimated over a period of three months. Infantry battalions averaged 1.13 per cent, the extremes ranging from 3 per cent in one battalion, 2.7 and 2.1 per cent in others, down to 0.2 per cent. Artillery units averaged 1.4 per cent, anti-tank companies 2.5 to 1.1 per cent. Among the 9th Division A.A.S.C. the average was 0.6 per cent, and in the 9th Division H.Q. 0.5 per cent. Anti-aircraft units, however, averaged 2.3 per cent, ranging from 9.1 per cent in one heavy unit to 3.4 per cent in one light unit, down to 0.4 per cent in others. The results of treatment were good, and many men were successfully returned to their units. R.M.Os. were instructed to hold some of the men with fear states in the R.A.P. areas, in a dug-out where they could feel reasonably comfortable and safe. Here they were fed as well as possible and given sedatives. Many men recovered after a good sleep and returned to the line. The work of the R.M.Os. in this field of preventive psychiatry described in the previous chapter was of a high order, and contributed notably to the morale of the force. When numbers were large the M.D.S. of the 2/3rd Field Ambulance was used to sort out the men, and many men recovered here too without being sent to hospital. The medical section of the 2/4th A.G.H. used a deep ready-made concrete cavern as a special safe shelter, and much successful work was carried out there.

One important prophylactic measure became evident after a time in Tobruk. This was the importance of eradicating men of a poor psychological type from forward units. There were many who were known to be really unsuitable for the regions of hazardous soldiering, and they later had to be returned as "NYDN". Admittedly it was a difficult problem to get rid of such men: combatant units always tend to look to the medical services to help them out.

Self-inflicted wounds also call for some further mention. Major Ackland reported that during the middle period of the siege these wounds were "alarmingly common". During several weeks in July almost half the

admissions to the 2/4th A.G.H. were of this type. At this time direct evacuation to Alexandria was the custom. Later, these men were kept in a ward holding about thirty, which was not in the safer beach section; they consisted of British, Australian and Polish troops. The numbers decreased thereafter, though news of the relief of the 9th Division was then to hand. Courts martial were held only if the evidence warranted such action.

GENERAL HEALTH IN THE DESERT

Descriptions of medical and surgical disabilities tend to lay emphasis on the minority who suffer from declared ill health. The health of a force may be judged not only by its sickness rates, but by its general well-being, alertness, endurance and capacity to accomplish the tasks set out. By these standards the Australian forces in the desert were healthy. Their rations were good on the whole, but a certain degree of monotony and the lack of enough fresh food were clearly discernible during the later months. Disher noted the possibility of some lack of vitamins in the rations of the 6th Division; no fresh milk was available, and very little butter. Bottled fruit juice was not popular with the men. In some of the settled areas where sea transport was possible, fresh meat and vegetables were obtainable occasionally, and efforts were made in Tobruk to supply fresh food when possible. Ice was obtainable in Tobruk and refrigeration was installed in the docks area, so that fresh meat could be kept on the occasions when it reached Tobruk. Furnell summarised the dietary deficiencies in this area as (1) lack of fresh vegetables and fruit, countered by the daily issue of ascorbic acid tablets, (2) lack of vitamin *B* complex, met by issue of "Marmite", and the use of 25 per cent Atta flour in making bread, and (3) lack of vitamin *A*, supplied by the use of English margarine when obtainable, which contained the necessary supplement, unlike the Australian margarine. Fresh fruit and vegetables were supplied when possible: for example 8 tons of onions arrived on a destroyer on one occasion, and in August the receipt of potatoes, marrows and citrus fruits gave welcome relief from monotony. The hazard of sea transport must be remembered; a number of supply ships were lost, and though a ninety days' supply was built up in Tobruk, the more perishable food could not be kept long. The desire for sweets and chocolates was noted early in 1941. Colonel Sproule, Director of Hygiene to the Middle East forces, advised that the Tobruk ration be reinforced by accessory foodstuffs, including cod liver oil, carrots, "Bemax", dried peas, and vitaminised margarine, but it was not found possible to supply these items except the last two.

In spite of hard living and some interludes of hard fighting, and exposure to risk and strain both the Australian divisions came through their trials in the Western Desert very well, and the chief aim of military medicine, prevention, was attained with a good measure of success.

CHAPTER 12

GREECE

ON 28th October 1940 the Italians attacked Greece without provocation. Immediately General Metaxas, the Greek dictator, appealed to Britain for naval help, air defence for Athens and supplies, and said that he would welcome British troops in Crete.

MILITARY AID FOR GREECE

On 1st November a British battalion landed in Crete, and on the 3rd, eight fighter-bombers arrived at Eleusis near Athens. On 15th November a force of 4,247, including three air squadrons and some military units that were to form a small British base, left Alexandria for Piraeus, the port of Athens. It included the 26th British General Hospital, the 189th Field Ambulance and the 48th Field Hygiene Section. The Greeks courageously resisted the Italian forces and drove them back into Albania. In January Mr Winston Churchill decided that if the Germans also attacked Greece, as they seemed likely to do in the spring, all other operations in the Middle East would have to be subordinated to giving support to the British Commonwealth's only surviving European ally. Consequently, on 13th January 1941 General Wavell and Air Chief Marshal Longmore went to Athens to discuss what help could be given. Wavell could only offer comparatively few units, and Metaxas, on the grounds that such a force would be inadequate and would only provide a pretext for a German attack, declined the proposal. However, on 18th January Metaxas asked Britain to begin disembarking such troops as could be spared for Greece as soon as the German army entered Bulgaria. On this basis discussions were held between the British and Greek staffs. It was agreed that Salonika could not be held, but that a defence line was practicable running from the coast along the Aliakmon River through Veria and north to Edessa and so to the border of Yugoslavia.

ANTI-MALARIAL PLANS

Thus, by the middle of January, though only a small force had been landed, planning of large-scale military operations in Greece was under way. A major problem that faced the medical staffs was the fact that large areas of Greece were malarious, and on 22nd January a medical appreciation of the danger of malaria in South-East Europe and Asia Minor was drawn up for General Wavell by Colonels N. Hamilton Fairley and J. S. K. Boyd. These officers spoke with great authority, based on personal experience and research and intimate knowledge of the conditions in these areas. They pointed out that malaria was endemic through South-East Europe and Asia Minor, and in certain localities were hyper-endemic. Such localities were the plains of Macedonia and the basins of the Vardar (Axios) and Struma Rivers. In these valleys extremely heavy casualties

from malaria had been suffered by British troops in 1916-1918, and conditions had since been made more dangerous by the immigration of refugees from Asia Minor. Fairley and Boyd emphasised the risk of using unseasoned troops in these areas, and pointed out that the Germans, who had intimate knowledge of this part of the world and of the research work of which it had been a post-war centre, might attempt to entice an enemy there during a summer campaign in the Balkans. Drawing the moral from previous military operations in Macedonia, and in the light of recent knowledge, they felt sure that, while military operations in these regions would be safe from October to May, great risks existed during the remainder of the year. Wavell, while admitting the dangers of malaria, asked if the anti-malarial work carried out by the Greeks in these valleys would not lessen these risks, and thought the report was "typical of a very non-medical and non-military spirit". In a personal interview with him Fairley and Boyd stressed the risk of malarial casualties despite all that had been done, in view of the difficulties of carrying out anti-larval and other measures in these areas, which were still highly malarious, and had an unparalleled incidence of blackwater fever. Wavell then withdrew any suggestion that their attitude was non-cooperative and promised assistance in carrying out measures that would mitigate the hazards of a malarial season. Meanwhile, on 29th January, General Metaxas had died, and the new Prime Minister, M. Koryzis, had renewed the Greek request that Britain should send help to Greece when the German force entered Bulgaria.

"LUSTRE" FORCE

On 7th February Benghazi was captured, and assistance to Greece became a more practical possibility. The British War Cabinet then directed that no further advance should be made in Cyrenaica, which was to be held by a minimum force, thereby setting army and air forces free to help the Greeks to resist a German advance through Bulgaria. On 11th February plans were begun for sending "Lustre" Force to Greece. The Order of Battle included one armoured division and three infantry divisions. The only troops available were part of the 2nd British Armoured Division, the 2nd New Zealand Division, the 6th and 7th Australian Divisions and a Polish brigade. General Blamey was in military principle opposed to the sending of Australian troops to Greece, but in yielding to political necessity he insisted that his 6th Division should be sent first, as it was equipped, trained and already experienced in action, whereas the 7th Division was not fully equipped or trained at that time.

Anxious to accelerate plans for building up a front against Germany in the Balkans, the British War Cabinet sent the Foreign Minister, Mr Eden, and the Chief of the General Staff, General Dill, to the Middle East to confer with General Wavell and the Greek leaders. Mr Eden succeeded in persuading the Greek Government to allow the British force of three divisions and two brigades to land as soon as possible. However, the delegation failed to reach agreement with General Papagos, the Greek commander, on a plan to withdraw the Greek forces in Eastern Macedonia

and Thrace behind the Aliakmon line, and consequently, early in March, when the German army began to advance into Bulgaria (and consequently there was no longer need to urge the Greeks to accept the British contingent) four Greek divisions were deployed precariously east of the Vardar. Papagos decided that he could safely withdraw only one division from Thrace to join the British and the two Greek divisions that formed his reserve on the Aliakmon line.

The Australian and New Zealand Governments, whose divisions were to form three-quarters of the fighting part of the force, agreed that assistance to Greece must be given as freely and promptly as possible. On 3rd March mines were dropped in the Suez Canal from the air, cutting off the ships carrying motor transport from the troop-carrying ships south of the block.

MEDICAL PREPARATIONS

On 5th March the first elements of "Lustre" Force sailed from Alexandria to Greece. At that date the plan was for the formations to proceed in the order: 1st Armoured Brigade, the New Zealand Division, 6th Australian Division, Polish Independent Brigade Group, and 7th Australian Division. The fulfilment of this programme was expected to occupy some two months. The British medical units in Lustre Force included the 26th General Hospital, part of the 189th Field Ambulance and the 48th Field Hygiene Section which had previously gone to Greece with the original force, and to this were added the 24th Casualty Clearing Station, the 4th and 168th Light Field Ambulances attached to the armoured brigade, 7th Advanced Depot Medical Stores and part of an ambulance car company. With the main contingent of the Australian forces, which included corps headquarters, 6th Australian Division and some corps troops, were listed the 2/5th and 2/6th Australian General Hospitals, of 1,200 and 600 beds respectively, the 2/3rd Casualty Clearing Station, the 2/1st, 2/2nd and 2/7th Field Ambulances, the 2/1st and 2/3rd Field Hygiene Sections and part of the 2/1st Motor Ambulance Convoy. With the New Zealand Division were the 1st New Zealand Hospital and 4th, 5th and 6th Field Ambulances, the 4th Field Hygiene Section, and later the mobile dental unit. A convalescent depot for 2,000 men was to be sent as soon as possible, the headquarters of the unit to be supplied by Australia, and the staff to be drawn from the Royal Army Medical Corps. Further planning included more medical units; among these were the 2/7th and 2/9th Australian General Hospitals which were not as yet fully equipped, and an Australian Advanced Depot Medical Stores and the 2/1st Australian Casualty Clearing Station.

When these orders arrived the 2/5th General Hospital was settling into a site at Kafr Balu, near Rehovot in Palestine and was fully equipped. The 2/6th was not yet working as a unit, but its equipment was fairly complete; deficiencies of such items as autoclaves were made up by drawing on the 2/1st Hospital at Gaza. The 2/1st, 2/2nd and 2/7th Field Ambulances had gained campaign experience in the desert and their equipment was fairly complete.

It was agreed that Colonels Fairley and W. A. Hailes, in addition to acting as Consultant Physician and Surgeon to the Australian forces, would act also as Consultants to the British Headquarters of "W" Force¹ in Greece. The need for a small Australian hospital in a port in the Middle East became evident at this time. Information was obtained from the navy at the end of March that Haifa and Alexandria would be used as ports for hospital ships bringing patients from Greece. The possibilities of the Italian hospital in Haifa and of part of the Greek hospital in Alexandria were considered, and the latter selected, as it would be convenient for receiving patients both from the Western Desert and from Greece. The isolation block of this Greek hospital was handed over rent-free by the Greek community, and here, in a modern steel and concrete building only a few years old, the establishment of a 200 bed hospital was begun under the command of Lieut-Colonel G. G. L. Stening.

The medical problems confronting Colonel W. W. S. Johnston, D.D.M.S. I Australian Corps and Colonel H. C. Disher, A.D.M.S. 6th Australian Division, were in the main those of any oversea expeditionary force which has to equip, supply, move and site its units, but these were particularly acute by reason of lack of both time and material. In addition there were special problems such as malaria, the disposal of sick and wounded, and administration, likely to present difficulties in a composite force, and particularly in a country where communications were rudimentary. There were also the unknown political and military factors in the Balkans whose uncertainty made it impossible to forecast what the commitments of Lustre Force would be and how they would affect the dispositions of troops. There was thus an element of anxiety in forward planning lest field medical units might be needed before they were available, and the successes of the campaign in the desert, with slender medical resources, might not be repeated.

Malaria was not yet, in the cold month of March, a present problem, but it loomed ahead, and by May it would begin to be a danger. The available knowledge of the country showed that many of the areas strategically and geographically suitable for bases were malarious. Arrangements were made for anti-malarial stores to be collected, and sent over with the force. General Burston, D.M.S. A.I.F. Middle East, had warned units on the Order of Battle of Lustre Force of the need for collecting and preparing all necessary anti-malarial equipment, and seeing that the men were trained in its use. Further planning would need to be done on the spot. Sites for hospitals had been discussed by the British force, one Australian hospital near the base in Athens close to the already established 26th British General Hospital, another at a more advanced base area near Volos, a secondary port farther north, and the 1st N.Z. General Hospital at Pharsala. Transport was likely to be a serious

¹ "W" Force comprised the British forces in the Aliakmon area and the Greek Central Macedonian Army. General Sir H. M. Wilson, who was to command it, arrived in Greece on 4 Mar., but through the insistence of the Greek Government that provocation of the Germans must be avoided, he had to remain incognito for a month. General Papagos was Commander-in-Chief of the Allied forces in Greece.

problem. The Greek Army was mechanised only to a slight extent, and its transport still depended chiefly on pack animals and oxen. Motor vehicles were likely to find troubles in this country of high mountains and deep valleys, with narrow tortuous roads, on which the mud of winter still lay thick. The evacuation of sick and wounded from the forward areas was likely to be difficult, and cold was a factor to be reckoned with too, especially in the high mountain passes.

The first Australian medical units to embark were the 2/3rd Casualty Clearing Station and the 2/6th General Hospital. They arrived at Piraeus on 8th March, a day before the 6th Division received its warning order for embarkation. This gave time for these units to establish themselves and prepare for work. In the meantime the divisional field medical units brought their equipment up to strength. This was done partly at Mersa Matruh and partly at Amiriya, and was controlled by local authorities directly under Middle East Command, an arrangement which caused some confusion at times, as the A.D.M.S. of the Australian Division had no actual authority in the matter.

The 2/6th Hospital, under Colonel R. A. Money, and the casualty clearing station under Lieut-Colonel J. C. Belisario, were billeted at Kephissia, a well-to-do suburb seventeen miles north of Athens, until all gear arrived. While there, their medical officers attended a clinical meeting held at the 26th British General Hospital which, having been firmly established in Greece, for several months, was in a number of ways very helpful to these and other units arriving later. On 16th March, in cold blustery weather, with rain and snow, the casualty clearing station went on to Larisa where part of the British 24th Casualty Clearing Station was camped, and staged there while the commander and A.D.M.S. of the sub-area, Colonel R. H. Alexander, went on to the Elasson area to select a site. On the 19th the unit was established in a pleasant site overlooked by Mount Olympus on the north-east, and set up wards and an operating theatre. Even at this early date many mosquitoes were about, and it was necessary for a swamp near the lines to be drained. A working party of Cypriots was obtained, drainage work was carried out and dug-outs prepared. Though the tents were already dispersed, Alexander ordered greater dispersal, with vehicles parked fifty yards apart. The tents were camouflaged with mud. On the day that this unit began to set up near Elasson the 16th Brigade, the leading brigade of the 6th Division, embarked from Alexandria.

Meanwhile the 2/6th Australian General Hospital, billeted in the same area as the 1st New Zealand, was discussing with Brigadier D. T. M. Large, D.D.M.S. British Troops in Greece, the question of a site. Representations were made by the surgical staff of the hospital as to the advantages of buildings for surgical work, but most of the available large buildings near Athens were already being used as Greek military hospitals. The plan was for the 2/6th A.G.H. to go north to Volos, but some natural reluctance was shown by force headquarters, in view of shortage of transport, to move the 350 tons of equipment already brought to

Kephissia back to Piraeus for trans-shipment. Therefore a suggestion was made that this hospital should stay at Kephissia, but the Australians were opposed to this, as the role of a base hospital seemed to be better served by a 1,200 bed unit. The 2/6th A.G.H. moved temporarily to a school in the neighbourhood, but Large made a definite decision a few days later that the unit should go to Volos. The New Zealand hospital went to Pharsala and established there. A surgical team including Major F. W. Niesche and Captain G. Read was detached from the 2/6th A.G.H. to work with the 168th British Light Field Ambulance, then in the Katerini area. The suitability of Volos from the malarial point of view having been confirmed, the A.G.H. opened a camp reception station there in an olive grove, and by the end of March work began on the laying of the hospital site. By this time the nurses for the 2/3rd C.C.S. and the 2/6th A.G.H. had arrived in Greece and were billeted in Athens.

The headquarters staff of I Australian Corps had now arrived, also the 16th Brigade Group, the 2/1st Ambulance, and the headquarters of the 6th Division; the 2/7th Field Ambulance was on the water. On the last day of March, 6th Divisional Headquarters under Major-General I. G. Mackay embarked at Alexandria in S.S. *Pennland* carrying some 3,000 troops. The medical arrangements on board were not found satisfactory from the Australian point of view. The regimental medical officers conducted sick parades of their units, but further medical arrangements were carried out by a permanent R.A.M.C. staff including a senior medical officer, and in addition there was a ship's surgeon. It was found that the medical arrangements on most of the transports ferrying "W" Force to Greece were primitive; the medical equipment was reported by Australian medical officers as being inadequate, barely sufficient for elementary first aid, and there was no special hospital accommodation, though the ships' hospitals could be used in an emergency. Arrangements were made for Australian medical orderlies to be attached to each transport and to remain with them to take charge of the equipment.

On 1st April a conference was held between Brigadier Large, Colonel Johnston and Major E. E. Dunlop, who had been appointed as Australian Medical Liaison Officer attached to British headquarters; hospital siting was discussed. The plans were based upon possible operations in the region of the line running from the Aliakmon River, through Edessa to Florina. Hospitals were as a general policy to be sited near ports; exposed sites were to be avoided and camouflage was to be used. The principle was accepted that Australian soldiers were to be treated as far as possible in Australian hospitals; all soldiers likely to be unfit for a month or more were to be returned to Egypt. A letter from the British Headquarters in Greece pointed out that owing to the slender resources of the Middle East Command all elements of the force could not be allotted separate reserves of beds to meet special contingencies and that the Australian Government would not expect this policy to be pressed in any way detrimental to the force as a whole. Sites were selected for the 2/5th Hospital near the site of the 26th British, for another 1,200 bed British

hospital and for a British advanced depot medical stores. At Volos it was proposed to establish the 2/7th Hospital as well as the 2/6th, and also the Australian advanced depot medical stores. Good sites for a convalescent depot were suggested, one at Varkiza, a health resort about twelve miles south of Athens; and another, less suitable, at Megalo-Pefko near the Bay of Salamis.

PREVENTIVE MEASURES

Other subjects discussed at this period were malaria and venereal disease. The malarial problem was thoroughly examined with Lieut-Colonel A. N. B. Odbert, Assistant Director of Hygiene. Due regard was paid to malarial risk in the siting of units, particularly the more or less stationary medical units, following the lines laid down at Middle East headquarters. One difficulty in seeking suitable sites was that a ready water supply often carried with it the disadvantage of a heavy malarial risk. It was then late in March and mosquitoes were biting already in areas near the snow lines, and malaria would possibly appear by the middle of April, though it would not be a considerable problem until the end of that month. Still, there was not much time to be lost in establishing control. For reasons already given by Fairley and Boyd it was hoped that the problems of the Vardar (Axios) and Struma Valleys would not have to be faced. Field work was progressing satisfactorily, but only part of the anti-malarial supplies had yet arrived, and half the Australian troops had not been issued with nets. Large had arranged for training of forty Greek foremen in anti-malarial work, and at the end of the month they were to be distributed with complete equipment, each in charge of a gang of twenty-three labourers, to carry out malaria control outside unit lines. Instructions were prepared by British, Australian and New Zealand medical headquarters giving full details of precautions to be observed and control work for which units were responsible. A British mobile malarial laboratory was already in Greece and notes were issued for the guidance of combatant officers.

Venereal disease caused some worry in anticipation. The incidence had been considerable in naval and air force units in Athens, where civilian control was loose, and the position was not regarded as satisfactory by Dunlop. He felt that the absence of official recognition of the problem by the Services up to that time in Greece was responsible for a lack of prophylactic arrangements. One preventive centre had been set up, staffed by orderlies from the 2/6th A.G.H., and arrangements had been made with the A.D.M.S. of the base area, Colonel J. B. Fulton, for the establishment of another. Steps were taken to hasten prophylactic supplies and a little later the question of disposal of men with syphilis was taken up. The Australian attitude was that they should be evacuated to Egypt to be treated in a special hospital and not retained in Greece. There was some local difference of opinion about this.

EVACUATION OF SICK

Meanwhile there were other matters to engage attention. Dunlop discussed questions of records with Large. It was arranged that all returns affecting the A.I.F. should go to their advanced echelon, and that consolidating returns be submitted concerning subjects of medical importance to force headquarters. Most important was the problem of evacuation of the sick. The area served by the medical units lay between the sea and the high mountain ranges which form the backbone of Greece. This area was itself also mountainous in parts, and possessed natural defences in that the central districts could be reached only through formidable defiles near Olympus, Katerini, Veria and the less precipitous pass of Edessa. Dunlop, after a reconnaissance north, concluded that "roads marked 'good' on maps were frequently deplorable, and those marked 'bad' were a nightmare".

The 2/1st Motor Ambulance Convoy headquarters and section "C" had arrived, and when "B" section arrived in a few days the effective strength of ambulance cars was brought up to forty-four. But when it was remembered that the Aliakmon line was 300 miles from Athens it was likely that the total of 125 ambulance cars available to medical units would be fully employed. Major W. E. E. Langford commanding the convoy, reported that the facilities for repair of damaged vehicles were poor, spare parts were scanty, and the single garage trailer available was incompletely equipped and would have to remain at the unit headquarters, leaving a wide area for the single breakdown lorry to cover. The unit headquarters were near Elasson and car posts were to be established at all main dressing stations and a number of intermediate points. Assurances were given to the British force that the resources of this unit would be freely available for their casualties.

The railways were all single track, and not all standard gauge; for example, the Larisa-Volos line was narrow gauge. Greek ambulance trains were available on the main lines, and three coaches on the narrow gauge track, but these were only converted trucks with twelve stretchers to each, with no lighting except a hurricane lamp, no cooking arrangements, no heating and no latrines. Efforts were being made at the time to secure better ambulance trains. In places the lines were vulnerable, and at the Brallos Pass between Lamia and Thebes the wrecking of a viaduct would have cut railway communications in that area for several months.

The general position was that the Aliakmon line was to be defended, with the New Zealand division on the right flank, the 6th Australian in the centre, in contact with the 12th and 20th Greek Divisions on the left, and on the left flank the British armoured brigade. At the beginning of April only the 16th Brigade, of the 6th Division, under Brigadier A. S. Allen had arrived to take over from the Greek 12th Division, which was temporarily holding the 6th Division sector in the Veria Pass. The New Zealand division, with headquarters at Katerini, was served by the 4th and 6th Field Ambulances, the 5th being held in reserve, and evacuations of sick were made to Larisa or Demerli over bad roads.

The 2/1st Field Ambulance, commanded by Lieut-Colonel R. H. Russell, on completing its establishment of motor transport after disembarkation, had moved its thirty tons of equipment up into the mountainous country, temporarily under the care of the New Zealand division. Here a position allotted by the 16th Brigade was taken up in a narrow cleft in the valley between Servia and Gerania. The country was very rugged, and there was difficulty in attaining that degree of dispersal considered safe by Allen. The first task of this unit was to carry out re-inoculation of the brigade group with "T.A.B." vaccine. Perhaps the time was not very opportune for this procedure, but the enteric fevers were known to be endemic and often severe in Greece.

DISPOSITION OF UNITS

The disposition of medical units in Greece at the end of March was as follows.²

- 26th British General Hospital: working at Kephissia near Athens;
- 2/6th Australian General Hospital: establishing at Volos, working a camp reception station;
- 1st N.Z. General Hospital: working at Pharsala;
- 24th British C.C.S.: heavy section at Larisa, with "B" Company 189th British Field Ambulance, not yet working; light section at Servia;
- 2/3rd Australian C.C.S.: working at Elasson;
- 189th British Field Ambulance at Larisa: working from the beginning of great help in fostering other forward units;
- 4th Light Field Ambulance of British Armoured Brigade at Edessa;
- 168th Light Field Ambulance of British Armoured Brigade at Mavrodendi, north of Kozani, with a surgical team from 2/6th A.G.H.;
- 4th New Zealand Field Ambulance and surgical team at Kalakouri;
- 5th New Zealand Field Ambulance at Dolikhe;
- 6th New Zealand Field Ambulance at Kato Melia;
- 2/1st Australian Field Ambulance, south of Servia;
- 2/3rd Australian Field Hygiene Section near Gerania;
- 5th Mobile Bacteriological Laboratory at Larisa;
- 2/1st Australian Motor Ambulance Convoy HQ near Elasson;
- 7th Advanced Depot Medical Stores near Kephissia.

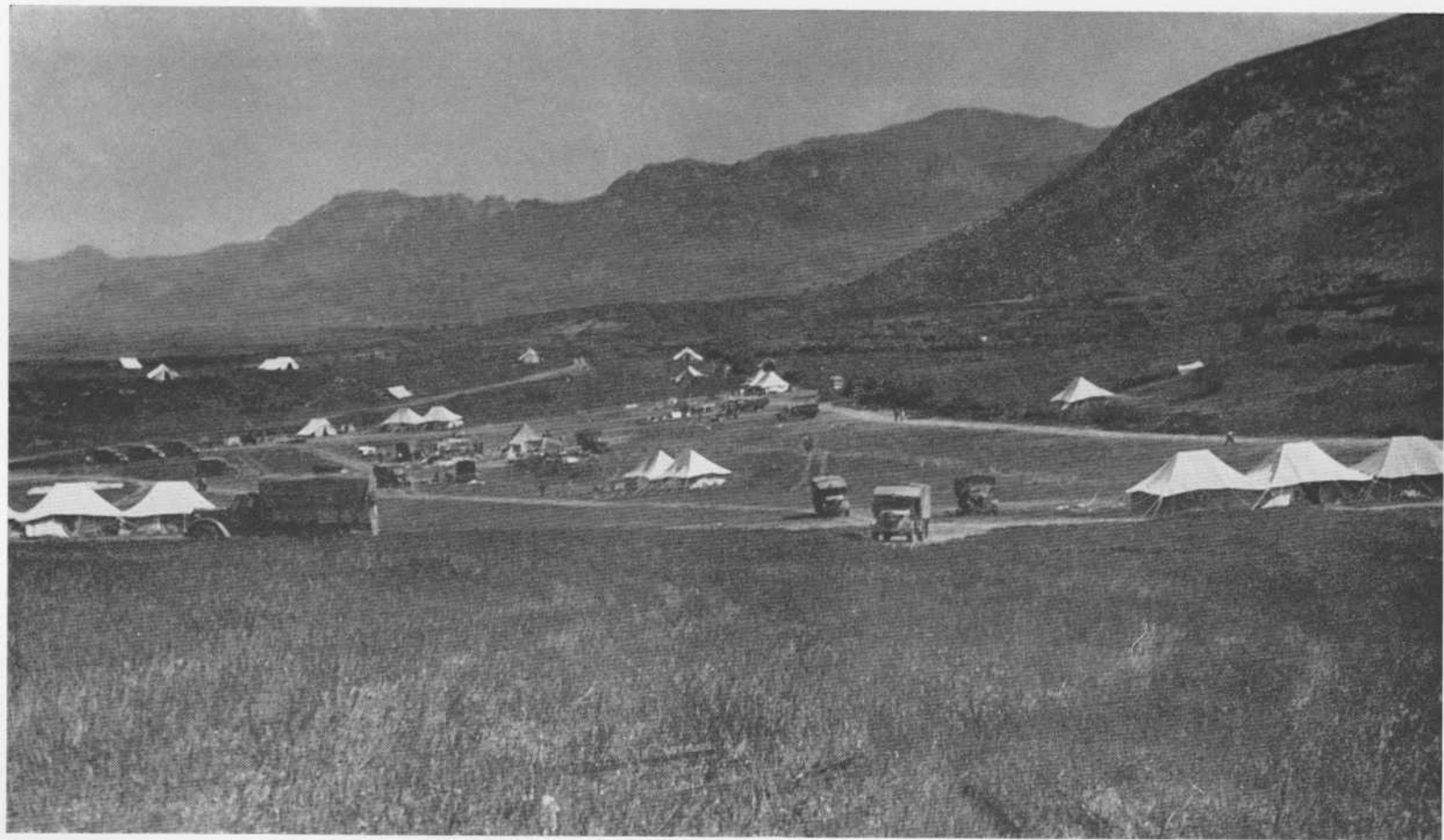
On 1st April the 2/7th Australian Field Ambulance arrived at Piraeus. A convoy on which some of its officers travelled was attacked from the air; one ship was hit and several men were killed. The following day another transport, the *Cyprian Prince*, was hit and sunk. On the 3rd the advanced headquarters of the 6th Division arrived at Piraeus, and left next day for the 16th Brigade area. The 19th Australian Infantry Brigade Group had now also arrived at Piraeus. The advanced headquarters of I Corps moved up to Gerania, near Elasson, and from this centre Colonel Johnston reviewed the medical organisation.

² The senior administrative medical officers were then as follows:
 At British headquarters in Athens: DDMS, Brig D. T. M. Large; DADMS, Maj J. B. Bunting; AD of Hyg, Lt-Col A. N. B. Odber; ADMS 80 Base Area (Athens), Col J. B. Fulton.
 At Larisa: ADMS 81 Base Sub-area, Col R. H. Alexander.
 At Adv HQ Brit Tps Greece (Elasson): ADMS, Lt-Col D. Crellin.
 AIF: DDMSI Aust Corps, Col W. W. S. Johnston; DADMS Maj W. P. MacCallum; ADMS 6 Div, Col H. C. Disher; DADMS, Maj A. L. Dawkins; MLO AIF (at HQ BTG), Maj E. E. Dunlop.
 N.Z.E.F.: ADMS 1 NZ Div, Col H. S. Kenrick.



Transference of sick and wounded from Tobruk by lighter to ship.

(Australian War Memorial)



The 2/3rd Casualty Clearing Station, Levadia, Greece.

(J. C. Belisario)

The arrangements for collection and evacuation of casualties were satisfactory. Advanced dressing stations were placed forward with sufficient accessibility to the main dressing stations, ambulance convoy waggons were distributed among all the holding medical units with four additional vehicles parked at Servia and twenty-three more in reserve. Rail evacuation was possible on the right sector, but it was not thought this could be relied on once action started. Johnston's responsibilities were not all clearly defined. For instance, it was uncertain who would administer the two British light field ambulances; the 24th British C.C.S. had its light section in the corps area, but its main section was outside it; also one section of the ambulance convoy was in the area, but the 2/3rd Casualty Clearing Station was outside it. Lieut-Colonel Crellin, A.D.M.S. of the advanced British force, referred these matters to Brigadier Large for decision, and control was unified under Colonel Johnston.

HEALTH AND HYGIENE

Anti-malarial measures were well in hand; in the New Zealand area they were to come into effect on 10th April. Most of the areas where troops were concentrated were highly malarious, and anopheline mosquitoes had already been caught in several places. Instructions had been issued for the formation of unit malarial squads, consisting of one N.C.O. and three men, whose training would devolve on the unit medical officer. Field squads were being raised, with foremen trained under directions of force headquarters, but as yet the administrative details were not settled. All the necessary anti-malarial gear was not yet to hand, and the stocks held were quite inadequate, but urgent demands had been made by the force. Mosquito nets were issued to medical units holding patients. No decision as to the administration of quinine in declared malarious areas had yet been made, but Johnston intended to order this only when troops were so placed as to be without the advantages of other forms of control, since there were as yet no adequate arrangements for the supply and distribution of quinine in suitable form. There was considerable shortage of medical supplies in the field units; the ambulances had used up most of the stores they had brought from Egypt, and the 7th Advanced Depot Medical Stores at Kephissia, was not very accessible to forward units considering conditions of transport, traffic and roads. An Australian depot stores unit was scheduled to come later and the intention was to place this at Agria near Volos. A corps reserve depot of stretchers was being established at Larisa and 250 were expected the next day. Dental requirements were considerable. Lieut-Colonel H. Finnie had made contact with all dental officers, though his position with base units needed to be clarified. A mobile unit for the New Zealand division was expected to arrive shortly. A British dental officer was posted to each medical unit, and there were no separate dental units, but it was agreed that any urgent requirements for British troops near Australian or New Zealand dental units would be met. The dental officer of the 2/6th Australian Hospital worked at 26th British General Hospital by request of its commander. A

suggestion was made also for staffing a dental aid post in Athens with Australian personnel, but as a British dental unit was expected no action was taken.

The health of the troops was good. A certain amount of infectious disease persisted, chiefly mumps, and respiratory infections, but the sick wastage was at a low level. Rations were good, and though most of the food was tinned, fresh bread was issued and fresh vegetables were expected. Water was plentiful, and chlorination of all supplies was ordered. The weather was then pleasant. The days were hot, particularly in the narrow valleys, even though they were dominated by snow-capped mountains, but the nights and early mornings were cold, particularly at the higher elevations. The countryside was beautifully green and covered with spring flowers.

THE GERMAN ATTACK

Meanwhile ominous events were taking place elsewhere. German forces had been massing in Bulgaria, and at the end of March it was estimated that they could concentrate eleven to thirteen divisions on the Macedonian frontier against four Greek divisions, and could bring six or seven divisions against the Aliakmon line. British leaders in Greece now learned that on 31st March the Germans launched an attack on Cyrenaica, and on 3rd April our forces were compelled to evacuate Benghazi. On 6th April General Blamey was informed that General Wavell had ordered a brigade of the 7th Australian Division to Tobruk, and it was evident that the help of the 7th Division and the Polish Independent Brigade could not be expected in Greece. In Yugoslavia events made it clear that the Germans were determined to dominate that country by political pressure or by arms, and in the early hours of Sunday 6th April German armies entered Yugoslavia and Greece. In the evening of that day the Greek force was still holding the forts in the Rupel Pass after suffering heavy casualties.

This swift blow necessitated changes in the plan, as the advancing enemy force the next day crossed the eastern frontier of Yugoslavia, and at Doiran split into two columns, one directed south to Salonika, the other pressing on towards the valley of the Axios River. It was obvious that there would be serious work to be done soon by the medical units. Already the 2/3rd Casualty Clearing Station was admitting patients for treatment, and the nurses had joined the unit on 6th April, just, so it seemed, at the right moment to help with the work that would increase rapidly from then onwards. With regret it was learned next day that the nurses would be withdrawn in a few days as there was a question if the unit was not already too far forward.

MEDICAL PROBLEMS

Let us now briefly consider what other units were available. The 2/1st Field Ambulance had set up a dressing station at the foot of the Veria Pass, and was charged with the medical care of the 16th Brigade which by 7th April was at Veria, and the 19th Brigade then in reserve. It was

clear that the dangerous situation developing on the weak left flank would demand a separate assignment for the 19th Brigade, and that the only Australian field ambulance then available would have to divide its resources. Major Young of this unit ascertained from the light section of the 24th Casualty Clearing Station situated just opposite the advanced headquarters of the 6th Division at Servia that they were not yet prepared to take patients, and therefore casualties would have to be sent back to Elasson. At the time of the German invasion the 2/6th A.G.H. was still trying to have its equipment moved north to Volos. The equipment was waiting on the docks at Piraeus when, on the night of the 6th, a sustained air attack was made on the harbour. An ammunition ship exploded, twenty ships were set alight and tremendous damage was done, the docks being almost completely gutted. Men were detailed for duty as stretcher bearers and to assist in first aid in the docks area. Among the casualties were one of the men of the 2/6th Hospital killed, and another injured. Men of this unit did very fine work during the emergency. Some damage was done to the hospital equipment, but the unharmed portion was moved back to Kephissia. This damage to the chief port of disembarkation was a severe blow to the forces in Greece. The Greek Army was seriously handicapped by shortage of ammunition, accentuated by this loss.

The 2/6th A.G.H. was now compelled to adopt a different plan, and a little later left Athens by train, taking the equipment readily available, which was fortunately that most needed. Meanwhile the 2/7th Ambulance, still in the region of the Piraeus Harbour, set up an aid post in the docks area in an air raid shelter, and assisted in evacuating casualties to the hospitals.

On 7th April, the day after the German invasion, the weather was bad and no information could be gained from air reconnaissance. The Germans reached the coast in Eastern Macedonia, but defences were consolidated on the Olympus passes where the Australians took over part of the front of the 12th Greek Division. Great anxiety was felt concerning the disposal of sick and wounded from the forward areas. Considerable strain had already fallen on the motor ambulance convoys, whose activities were dispersed over a wide area. Some cars had to be used in the Larisa and Pharsala areas, the latter to connect with Demerli on the main railway line. Other cars were needed by the 189th Field Ambulance for the use of the base sub-area at Larisa. Still farther forward the troubles were greater. The roads themselves were a hazard; the only road through the Veria Pass was very narrow, and in places there were but rough tracks, in others no tracks whatever. Snow and mud impeded movement everywhere. Forward troops with the 16th Brigade suffered great discomforts, their advanced sections occupied positions in the snow, and company stretcher bearers had carries of one and a half to three miles. Donkeys were used at the aid posts to carry equipment and held there to help in evacuations of wounded later if there were any. It was perhaps some consolation that heavy rain and snow would be likely also to delay the enemy, but the acute difficulty remained. Disher, concerned with the

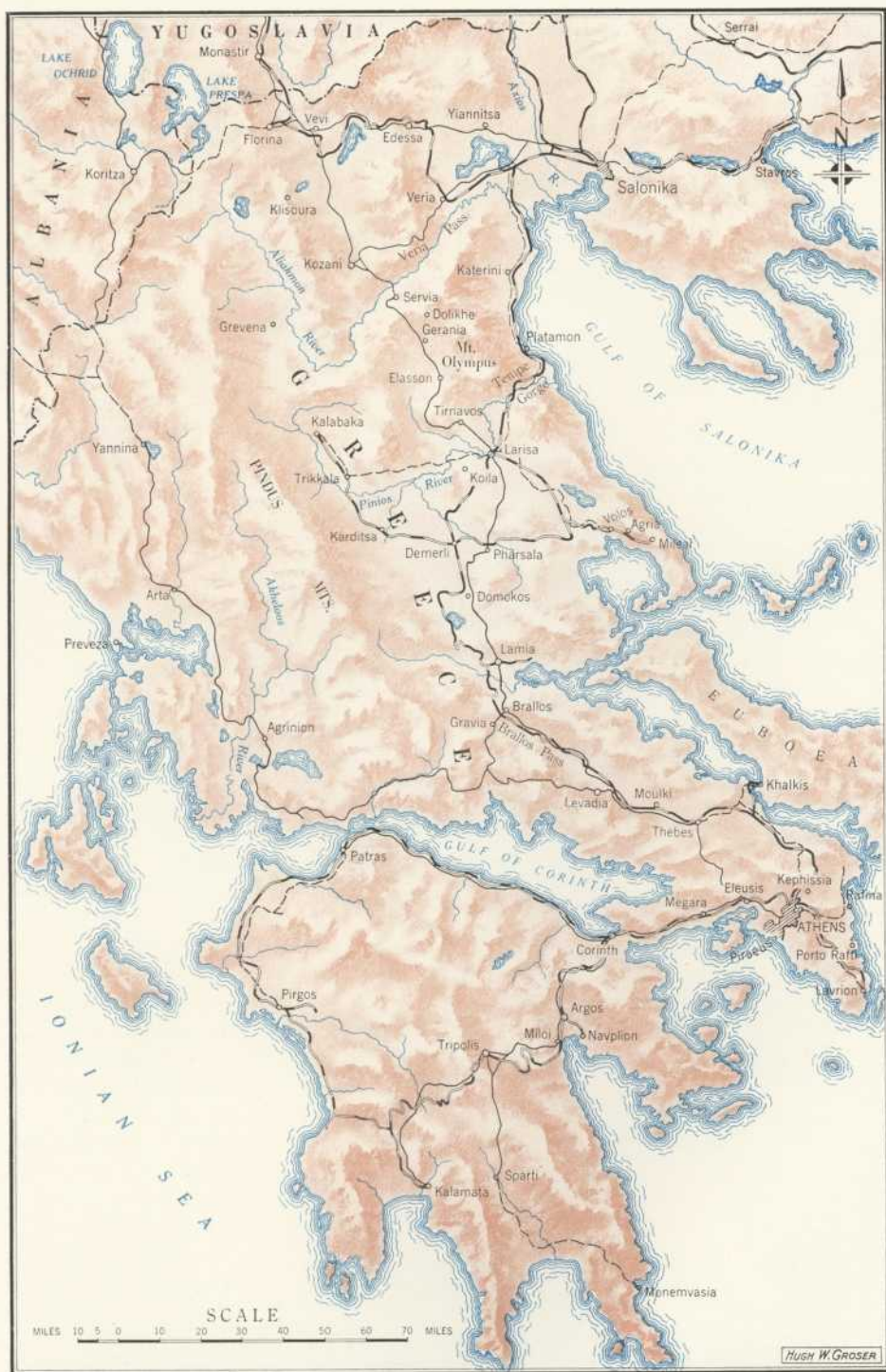
problem of getting men in from places where stretcher carrying was almost impossible, was trying to get mules. A hundred Thompson-Hill stretchers, as used in India, were on order from Egypt. These were designed for rough hill country and consisted of a long oaken pole from which canvas was suspended like a hammock. These and the Neil Robertson type, a modification of which was carried by New Zealand field ambulances, were needed where steep tracks sometimes made it necessary to tilt the stretcher almost to the vertical.

Little time was available now for arrangements. Word was received at corps headquarters on 8th April that Yugoslavia was collapsing and that the plan was changed to meet the challenge from the north on the left flank. General Wilson ordered Major-General Mackay to take command of a force including the armoured brigade, two battalions of the 19th Australian Brigade, and several artillery units, and defend the Florina Valley, down which a German advance from Yugoslavia might be expected. At the same time the 4th New Zealand Brigade began to move into the Servia Pass in case of further pressure on the right flank.

British troops encountered the Germans for the first time on this day, 8th April. Medical arrangements in the forward areas were perforce thin, for two of the three Australian divisional ambulances, the 2/2nd and 2/7th were still waiting the arrival of their main portions in Athens. The best that could be done was to send forward ten ambulance cars from these units. Disher, with only one field ambulance at his disposal, sent "A" Company under Major C. D. Donald of the 2/1st, reinforced by Captain R. F. Matthews and some men from its Headquarters Company, to cover the medical needs of the 19th Brigade. The balance of the unit remained at the Veria Pass.

Poverty of communication was now apparent throughout the areas held by the Allied forces. Already it had been remarked at medical headquarters in Athens that news from corps arrived very slowly, and in the forward areas the remote control of the force headquarters was complicating administration. Disher was also unable to make contact with Johnston except with difficulty. His own headquarters was moving to Perdika; he sent a message to the 4th British Light Field Ambulance about its arrangements, but, feeling uncertain that this would reach its commander, he spent the night fruitlessly trying to find this unit, which was struggling with mud and traffic on the way down from Edessa. Next morning he met the commander of this unit, with "A" Company of the 2/1st Ambulance attached, now well along the road to Perdika. These two units combined to form a mobile section along this road, and the remainder of the Australian unit was attached to a main dressing station opened by the British ambulance near Perdika. Despite the hardships of weather and movement there was little illness. Occasional enemy planes flew over this area; fortunately adverse weather had not favoured air operations.

Disher, going on to Mavrodendri to see the 168th British Light Field Ambulance met Johnston and asked him if he could temporarily take



Greece.

the headquarters of the 2/1st Ambulance under his control, owing to the impossibility of keeping in touch with the different areas under unpredictable conditions. They agreed also to establish a staging post in the Petrana area where it could serve both the 16th and 19th Brigades. Since the distance to a clearing station was considerable a surgical team was attached to this post. Heavy rain continued, and off the main roads all tracks were very muddy.

The 2/3rd Casualty Clearing Station at Elasson had meanwhile been the cause of some discussion. Crellin at the advanced force headquarters had told Johnston that the responsible officers of this headquarters thought the unit was too far forward. However, the Australian view was that if policy dictated the holding of the Aliakmon line as it stood, then the C.C.S. should remain. It was agreed that the nurses should not stay, and they were withdrawn on 9th April to Pharsala and quartered with the New Zealand hospital nurses. The same day the C.C.S. received its first battle casualty, a Yugoslav. The quickening of the rate of work threw an extra burden on the male staff, already labouring under the difficulty of extreme dispersal, with each set of tents 100 yards from its neighbours, and no more than three E.P.I.P.³ tents brigaded together. Casualties were now being evacuated to the 24th British Casualty Clearing Station instead of the New Zealand hospital at Pharsala. A great deal of work had been necessary to prepare the area at Elasson. The site was a good flat one, extending round a high hill, but the lack of natural cover made wider dispersion necessary. Colonel Alexander at first advised that the Red Cross sign be removed, but after a few days it was replaced. It was necessary, too, to widen the road for ambulance traffic and to make a new circular roadway to eliminate traffic blocks and delays.

On 10th April the full strength of the 2/6th A.G.H. arrived at Volos, and set about meeting the now urgent need for hospital beds with all despatch. Military events were likely to take place with unpredictable speed. The slowing down of the German advance on Monastir gave a little more time, but it was evident that the line would have to be adjusted till a position could be taken up suitable for protracted defence. General Blamey now commanded the New Zealand Division, the 16th Australian Brigade, part of the 12th Greek Division and some artillery on the right, and General Kotulas the Greek forces in the centre. On this day, 10th April, the Germans entered Salonika, and on the left sector were only fifteen to twenty miles away. During the day the Eastern Macedonian Army surrendered, but by then the New Zealand and Australian positions were consolidating well on the right. On Good Friday, 11th April, in sleet and snow the Germans attacked at Vevi on the left, but though their heavy assaults were held, plans were made to withdraw.

The 17th Australian Brigade had now arrived, and Blamey asked that it should be sent forward as soon as possible; the brigade accordingly moved forward to Larisa. Wavell arrived in Greece and confirmed the decision that the 7th Australian Division should be sent to the Western

³ European Privates Indian Pattern.

Desert and not to Greece. In the desert the position had deteriorated still further, as the Germans had invested Tobruk.

The forward medical arrangements for Australian troops still depended chiefly on the 2/1st Field Ambulance. The reinforced company, which had been sent under Donald to the left flank to join the 4th Light Field Ambulance, appeared now not to be wanted there, as the latter unit's function was concerned with the armoured brigade which was to withdraw to the Grevena area. At first this company was instructed to return to the main body of the ambulance working with the 16th Brigade in the centre, but Disher thought that the mobile section which had accompanied the 19th Brigade would be insufficient, and directed Donald to join the 19th Brigade which formed the major part of Mackay's force.

ACROSS THE ALIAKMON RIVER

This force had to cover the withdrawal of "W" Force to new positions in the Olympus passes, on the Aliakmon and in the passes north of that river. While the 16th Brigade began to withdraw from Veria on 12th April to a position on the right of the 4th New Zealand Brigade, the 19th was to move west into the mountains to a position on the left of the New Zealanders, but separated from them by the wide, fast-flowing Aliakmon. The only permanent bridge over the Aliakmon in the Servia area was to be blown up.

The proposed deployment of the 19th Brigade north of the still unbridged river created a difficult medical problem. On the 12th a reinforced company of the 2/1st Ambulance was retiring with the 19th Brigade to a position where casualties might have to be held for some days, out of touch with other sources of medical supplies and assistances. The only other alternative was to send casualties by cross-country roads and tracks through Kalabaka and Trikkala to Larisa, a detour of some eighty miles over roads which were then almost impassable. Even the bridging of the river would leave a distance of some eight miles over which patients must somehow be carried to the nearest ambulance car post. Work was proceeding on these roads so as to save the long detour westward, and improvement was expected in forty-eight hours provided more heavy rain did not fall. The ambulance company had to proceed as far as possible in vehicles with the brigade group, and thence travel on foot, using pack animals for the equipment. The main dressing station which they were to set up would then have to be self-contained and hold patients for several days at least till a bridge was constructed. Then the patients could be moved by mules or bearers across the river to a staging post at Lazaradis where motor ambulances could take them back to the most convenient staging or receiving unit. The initial movement was safely accomplished and the force with its slender medical resources was temporarily isolated.

MEDICAL WORK

The remainder of the 16th Brigade was now marching back across the mountains to its new defence area in the Servia Pass, and the task of the

2/1st Ambulance, whose headquarters was near Gerania, was to clear casualties from the brigade to the 5th New Zealand Field Ambulance with the New Zealand brigade at Servia. The pass was covered with snow, and in this very cold weather the task was likely to be difficult.

The 2/3rd C.C.S. at Elasson was instructed to send on patients to the 24th Casualty Clearing Station at Larisa as promptly as possible in order to keep its own beds constantly free for possible needs. At the former unit there was a dump of 250 stretchers, some of which were being distributed by the returning ambulance cars to the forward ambulances. The need for special types of stretchers was felt here, especially in view of the slippery roads and the precipitous nature of the country. Both casualty clearing stations held some supplies of drugs and dressings for issue to the field ambulances, but these were becoming limited. Blankets were in readiness at all the main dressing stations. Some anxiety was felt about water supply to isolated units or detachments, not on account of shortage of water but because of difficulty in ensuring its sterilisation. Individual sterilising outfits were needed in some places, and an issue of up to 20 per cent was recommended. The 2/1st Australian Field Hygiene Section had arrived and was working at Larisa, but even with two such sections at work coordinated by Major Carruthers it was difficult to supervise hygiene. The ultimate responsibility rested with each unit.

On 12th April the 2/3rd Casualty Clearing Station was in a precarious position at Elasson, working very hard with two surgical teams operating simultaneously on tired men, some with muddy wounds, but in surprisingly good spirits and condition. These casualties had been evacuated farther south through Servia, but this route would be closed on the following day when the bridge over the Aliakmon was to be demolished in the retreat.

The 2/6th Hospital at Volos, working hard at setting up the unit ready for full activities, hoped to be able to take patients in the next day or two. The 2/5th Hospital arrived that day 12th April at Piraeus and though the port facilities were greatly reduced through recent air attacks, necessitating the use of small ships such as Greek fishing craft, it was hoped they would soon be accommodated near Athens, where on an excellent site with some good buildings their ordnance equipment already awaited their arrival. On the same ship arrived General Burston, D.M.S., A.I.F., on a tour of inspection, and the balance of the personnel of the 2/2nd and 2/7th Field Ambulances. Further medical stores had arrived also, including a quantity of anti-malarial supplies, though some essential items were still scarce.

THE ANZAC CORPS

Fortunately the bad weather in the north for a time prevented the German air force from further harassing the men working on the docks at Piraeus. An encouraging appeal to national tradition was made on 12th April, when General Blamey, whose command of the I Australian Corps embraced the New Zealand and 6th Australian Divisions, renamed his command the Anzac Corps.

THE OLYMPUS-ALIAKMON LINE

On 13th April, Easter Sunday, German forces attacked heavily on the Anzac left, both on the ground and in the air, and on the right, where New Zealanders had demolished the bridge across the Aliakmon, the Germans were beginning to cross the river. The 12th and 20th Greek Divisions, hampered by their lack of modern transport and equipment, and feeling the strain of their hard campaigns, were crossing the line of withdrawal of Mackay's force. The withdrawal of the British and Australian forces was carried out without major mishap. The complete establishment of the Olympus-Aliakmon line was now in sight, but with the bewildering rapidity characteristic of this campaign the position was already altered, and it was now apparent that this line could not be held. A break-through by the Germans was considered possible in the region of Klisoura on the left where the Greek forces were not expected to hold, therefore General Wilson decided that the Allied position must be consolidated on a line based on Thermopylae.

Dunlop, on a visit to forward areas, found the Australian casualty clearing station filled to capacity with 200 patients and at times carrying up to 400, in spite of continuous movement of sick and wounded back to the 24th Casualty Clearing Station. Sickness had reduced the male nursing staff, who were now working without the sisters. Movement of the nurses from Athens to Volos to the 2/6th A.G.H. had also been cancelled. Johnston and Disher were still worried over evacuations of casualties from the 19th Brigade across the river. Some of the alternative roads were already under enemy observation, but one consolation in the continuing bad weather and snow storms on the uplands was that the enemy air action was greatly hampered, although this lull was of course only temporary. It was now clear that the 2/3rd C.C.S. was within the danger zone, and therefore it was necessary for this unit to cease receiving patients, evacuate the remainder and pack for departure. It was fortunate that in the prevailing muddiness of the countryside more serious infections had not been encountered. Sulphapyridine paste was used on most of the wounds, but amputation was necessary in two cases where gas gangrene had occurred. Difficulties arose too in the evacuation of the Veria Pass road. The rear main dressing station formed at Koila by the 4th Light Field Ambulance had to be cleared of patients. This necessitated taking the wounded through Servia, and on that night no motor traffic from the south was permitted to pass that town. Unfortunately Langford had not been informed of this bar to the movement north of his ambulance convoy, but when the expected cars did not arrive at Koila others were available at the 168th Light Field Ambulance and the patients were all brought out without trouble.

OVER THE MOUNTAIN PASSES

It was indeed fortunate that there were no battle casualties from the 16th and 19th Brigades at that stage, or serious difficulties would have arisen, as both formations had to make arduous and difficult withdrawals.

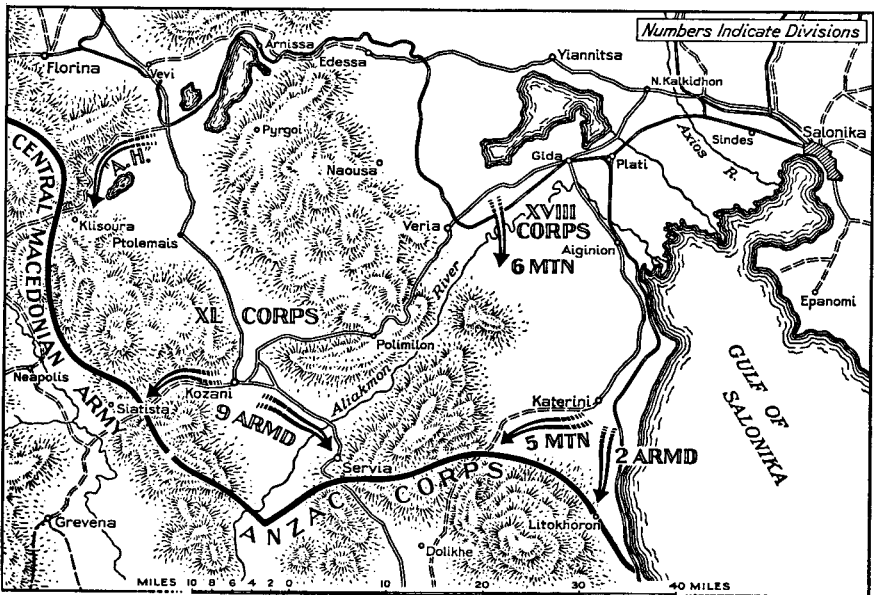
A medical detachment from 2/1st Field Ambulance was supplied for the 16th Brigade, while the ambulance as a body was packed for movement. Even before the withdrawal from the pass had began the conditions were very trying; it was snowing continuously and very cold. Ten donkeys and two drivers were obtained for the use of the ambulance and these were divided between two medical officers, Captains C. H. Selby and J. A. F. Flashman. The animals carried rations and supplies and some were left unloaded so that they might carry casualties. During the passage through the narrow defile in the mountains a mobile section which had been working there was withdrawn, and "B" Company of the ambulance was able to close the main dressing station where it had replaced the headquarters of the unit. The night of the 12th was intensely cold; the donkey parties sheltered in a dug-out, and had to trust to the natural hardness of the animals to withstand the freezing conditions outside. Parties coming over the shoulder of the snowy pass saw a flickering light far below: on reaching the river crossing before dawn they found this was an unofficial fire lit to give a welcome cup of tea to the men. A rear dressing station was necessary as the brigade retired, but there was no need for the Australian Ambulance to open one on the 13th, as arrangements had been made for the 5th New Zealand Field Ambulance which was only a few miles along the road to enlarge its main dressing station using some of the equipment of the 2/1st Field Ambulance. This allowed the Australian Ambulance to concentrate on the difficult evacuations from forward areas. Some sick men had to be left with villagers on 13th April, as the track to Levadia was covered with snow and it was impossible to move them.

During the withdrawal of the 16th Brigade over the Pass reconnaissances were carried out by small parties from the 2/1st Field Ambulance headquarters, so as to maintain contact with the detachments serving the moving brigade. Though dressing stations were available such as that just mentioned, designed to serve the 4th New Zealand Brigade, it was most difficult to make contact with them. Nevertheless the work carried out on this march by the ambulance was most useful. The troops were extremely fatigued and a number suffered from early frost-bite. On two successive nights an ambulance car was sent to the river crossing with a medical officer and details to take medical supplies and comforts and to give necessary attention.

Meanwhile the obscurity with regard to the medical well-being of the 19th Brigade was unrelieved, for the force was still on the north side of the Aliakmon River. Little was known since the news received on 13th April that the brigade had safely taken up its assigned position. Arrangements were made between the commanders of the 5th New Zealand Field Ambulance and the 2/1st Australian Field Ambulance to facilitate the staging of Australian wounded evacuated by the M.A.C. from forward areas.

THE THERMOPYLAE LINE

On the 14th, before the withdrawal to the Aliakmon position was finished arrangements were being made for the further withdrawal to the Thermopylae line because of the threat of a German break-through on the left in the Klisoura area. There was a danger that the enemy might come in behind the new defensive position of the Anzac Corps, and to meet this the newly-arrived 17th Australian Brigade, under Brigadier S. G. Savage, was used as the basis of "Savage" Force in the Kalabaka area. The armoured brigade was heavily attacked from the air near Grevena, but the Germans did not press on there, which gave a little more time for adjustment on this sector.



Allied line 14th April.

The corps plan assigned to the 2/2nd Ambulance the duty of providing medical service for Savage Force, but Johnston had not up to that date seen Lieut-Colonel D. M. Salter and his unit and did not know their whereabouts.

Corps headquarters at Elasson was bombed for the first time on the 14th and was consequently moved two miles away from the village. Blamey told Burston, who had just arrived to confer with Johnston, that he was to return to base on account of the constantly changing situation. He also directed that the Australian C.C.S. should be moved farther back. Arrangements were in hand for this move and, owing to the almost impossible state of communications, Large could not keep in touch with the local situation, and left the decisions concerning that unit and the

24th Casualty Clearing Station to Colonel Alexander, A.D.M.S. of 81 Base Sub-Area at Larisa. At corps headquarters Johnston and Crellin at advanced British headquarters discussed the details. It was planned that a main dressing station should be opened by the 6th New Zealand Field Ambulance near the site of the 2/3rd C.C.S. so as to hold patients only as long as essential, doing only urgent surgery and evacuating to the 24th C.C.S. Partly through a misunderstanding in the origin of the message and partly because of increased medical needs elsewhere the New Zealand A.D.M.S. refused to allow the ambulance to go without the permission of the divisional commander. Belisario was instructed by Johnston to move his casualty clearing station on the following day after disposing of his patients, and proceeded in three parties to a site eight miles south of Larisa, which had been chosen at a conference with corps officers two days earlier. But now, Belisario was instructed not to unpack and to re-open the unit thirty miles south of Lamia, well to the rear of the new position to which the Anzac Corps was withdrawing.

Meanwhile the 2/6th Hospital had erected and camouflaged enough tents at Volos to take 180 patients; forty-two walking wounded arrived through the day of the 13th. Late that night Lieut-Colonel J. H. Courage, commanding the troops at Volos, notified Colonel Money the hospital commander, that the area would probably be evacuated the next day. This was a blow to the hospital staff who had already encountered many difficulties in getting their equipment to Volos. Indeed most of it had not yet arrived, as some of the ships carrying it had turned back and discharged their cargo to be loaded into trains. A conference of the hospital staff was held and packing began at once. The plan was for patients and hospital personnel to be removed by cars to the Volos docks, and then taken in caiques to a ship by the Royal Navy, but an air raid took place and it was then found that the harbour-master had left the town. Money attempted to get away important equipment, but train arrangements had broken down and the ship *Bantria* which expected to take patients, part of the staff and equipment, was short of crew and could not shift equipment. The senior officers of the hospital at this stage asked the commander to allow patients and staff to embark in view of the apparent danger of the situation and to leave the equipment. Attempts to obtain accurate information from Larisa were unsuccessful, so Money, though believing that the degree of risk was not such as to justify such haste, had fifty-six patients rowed out with some of the hospital staff to the ship which then left the harbour. Money and his party proceeded by road to Athens.

MEDICAL SITUATION PRECARIOUS

Thus were the two chief holding medical units of the A.I.F. made inoperative in a day. In addition the 24th British C.C.S. was left without equipment, and likewise the 1st N.Z. General Hospital. Lieut-Colonel Mollan commanding the 24th C.C.S. was apparently instructed verbally to clear as many patients as possible and to leave his equipment; if he could not dispose of all patients he was to leave enough staff to care for

them. Whether the 2/6th Hospital would be able to re-establish now depended on what happened to its equipment, some of which was left without much security at Agria and Volos; some was believed still to be *en route* by rail, and messages were sent to Larisa to stop this from being forwarded to Volos. On the 15th April communications were still more uncertain. Larisa and Servia were bombed, and the elements of the Royal Air Force were ordered to return to Athens. The Australian hospital position was eased a little by the arrival of the 2/5th A.G.H. commanded by Colonel W. E. Kay, at Ekali on the outskirts of Athens. Here, with a good surgical block and theatre in a hotel building, billets for nurses in hotels, and officers in cottages, the unit worked with all possible speed and during the day after arrival at the site was able to accommodate fifty patients.

While this was happening and while the main body of the 2/3rd Casualty Clearing Station was crossing the mountains on the way to a site farther south the 2/2nd Field Ambulance, travelling in a convoy from Eleusis, arrived at Larisa. Salter found that his unit was unexpected by the A.D.M.S. of the area who had not been told it was coming forward. Alexander, not knowing of any assignment for the ambulance, advised Salter to destroy his papers and return to Athens. However, the unit was permitted to camp nearby, and acting under later instructions from the D.D.M.S. Anzac Corps, it came under direction of Brigadier Savage's headquarters. There was great air activity in the Larisa area at this time, a reflex of the whole military position, which was unstable and rapidly changing. Withdrawal to a line based on Thermopylae was now necessary, and on the 15th a comprehensive order was issued from corps headquarters covering the moves. Before this was circulated General Blamey instructed General Mackay that as a first step he should move the 19th Brigade back across the Aliakmon that day.

Farther to the right the Germans had crossed the Aliakmon and attacked the New Zealanders in the Servia Pass, but suffered severe losses and made little progress. The plans for withdrawal provided that on the night of 15th/16th the 6th New Zealand Brigade, taking up a position across the roads leading from the north into Elasson and Tirnavos, should cover the withdrawal of the forces in the Olympus passes. The 16th Brigade was to move back astride the Trikkala road to Zarkos. The 19th Brigade, after crossing the river, was to go to Domokos where, with detachments of the 17th Brigade, it would form a final rearguard to cover the withdrawal of the force across the open plain of Thessaly. This done, the 4th and 5th New Zealand Brigades would withdraw through the 6th and the Domokos force to Thermopylae and then rearguards would follow. A new factor entered, however, when late on the 15th news reached Blamey that the 21st New Zealand Battalion, which was holding the narrow pass on the coastal ledge at Platamon, was being hard-pressed by a strong German force which, if it succeeded, might reach Larisa through the Pinios Gorge and cut off the retreat of the main body of the

Anzac Corps. Promptly Blamey ordered Brigadier Allen to take two of his battalions to the Pinios area and take command there.

SERIOUS MEDICAL LOSSES

On the 15th, Burston called on the New Zealand hospital at Pharsala, and found that McKillop had received orders from Alexander at Larisa base sub-area to send away all patients and nurses at once by train, and, leaving all equipment behind and all tents standing, to follow with the rest of the staff. This instruction was similar to that received by the 2/6th Hospital. Burston thought that the situation hardly called for such haste. It was thought at the base headquarters at this time that the Germans might outflank our forces at Larisa, though the medical heads of the Anzac Corps found it hard to imagine that this force would be by-passed or that substantial actions would not be fought. Dunlop, the medical liaison officer, returning on 14th April from a visit to forward areas learnt from Large that not only were withdrawals of large medical units imperative but that loss of their equipment was likely. It was hard to credit that the situation was so bad. Burston also felt that there should be a good chance of saving equipment of great value to the force. Actually the 2/3rd C.C.S. had successfully removed their equipment to a new site, and the commander of the 2/6th A.G.H., though frustrated in his efforts to move the equipment which the unit had packed, still hoped to be able to retrieve at least part of this. The commander and staff of the New Zealand hospital were quite prepared to risk capture if necessary, and were loth to leave so much valuable material, already a prey to local looters.

On the roads leading south there was great congestion intensified by Greek horse transport, Yugoslav refugees and herds being driven from the north. Meanwhile little was yet known about the augmented "A" Company of the 2/1st Ambulance with the 19th Brigade north of the Aliakmon River. Major Dawkins, D.A.D.M.S. of the 6th Division, had tried on the previous day to make contact with his party, taking three motor ambulances, bearers and supplies, but owing to air raids, in one of which a driver was wounded, and the local military conditions, the vehicles were not allowed to proceed over the Servia Pass. The river had not yet been bridged and the roads leading south of the river towards the 19th Brigade area were now under enemy observation. Several attempts were made to get through, but as Disher thought these would be fruitless he made arrangements for Captain W. W. Gunther and two non-commissioned officers to be driven as far as possible, and then to make their way on foot. Going on to corps headquarters after despatching this party he learned of the plans for withdrawal to Thermopylae, and was further worried lest Gunther should arrive after the brigade had left. It was then too late to recall the party.

THE 19TH BRIGADE CROSS THE ALIAKMON

Next day the situation was less obscure though the military position was complex. The 19th Brigade had now made a successful withdrawal

across the river by night, using the hastily finished bridge and a ferry. Fortunately the medical detachment did not have many casualties to deal with, but on the day before retirement, when forty-eight patients were in the advanced dressing station and more were arriving the timely allotment of a light truck for medical purposes was of great value.

The route taken by the retiring troops could hardly have been more difficult, over steep and often precipitous rocky ground with a drop of 1,000 feet to the rapidly flowing river, beyond which were high mountains. Donald and his party with the assistance of infantrymen loaded stretchers on to engineers' trucks, and manoeuvred them by hand over the declivities of this forbidding trail. All but two of the casualties were able to cross the bridge on foot. Gunther and his small band had actually succeeded in reaching the ambulance company after a journey made dangerous by the enemy, the weather and the difficult country. After ten and a half hours' hard going, the distance, only ten miles as the crow flies, was covered and the tired ambulance company was taken with its patients to its unit headquarters.

MOVEMENTS OF FIELD UNITS

On the night of the 16th the main body of the 2/1st Ambulance moved south with the general convoy. Motor ambulance convoy cars helped to take on some of the casualties. Further air attacks took place along the road, especially just north of Larisa. Larisa itself had suffered considerable damage, and conditions there were very confused. Lieut-Colonel Russell commanding the 2/1st Ambulance, was now instructed to report to Brigadier E. A. Lee at the headquarters of his rearguard force, for which medical attention had to be supplied. Accordingly he set up a main dressing station south of Domokos away from the confusion of the traffic. According to the original Anzac orders the 2/7th Field Ambulance had been allotted to Lee Force. Once more illustrating the difficulties of administration experienced by corps medical headquarters, the only news received to that date by Johnston about this ambulance was that it was still at Athens. He had neither seen its members nor been able to make contact with them. Lieut-Colonel Le Souef commanding the ambulance had actually been despatched on the 14th from Voulas camp in the Athens area with his unit, the balance of which had just arrived in Greece. The following day they were met at Brallos Pass by a despatch rider with the message from Large through the Larisa sub-area that he and his party were to return. The convoy turned about and returned to Athens, where Le Souef and his unit were employed in preparing accommodation for convalescents and for about 400 lightly wounded who were then being brought on by ambulance trains from Larisa.

The 2/2nd Ambulance, now with Savage Force, formed a dressing station north of Trikkala, where the road was almost impassable, owing to the throngs of Greek soldiers and civilians. A mobile dressing station was set up and camouflaged, and worked for one day. This later proved to be the only time that the unit was unpacked while in Greece.

At Athens Large decided on 16th April that the British 26th General Hospital and the 2/5th Australian General Hospital should remain open to their present capacity, if necessary remaining to be taken prisoners. Burston at once insisted that immediate arrangements should be made to evacuate all British, Australian and New Zealand nurses. Hospital ships had been requisitioned and as one was expected on 19th April, the nurses could travel on this, if necessary sleeping on the decks. For the present, nursing staffs of hospitals working in Athens were to remain at work.

WITHDRAWAL FROM THERMOPYLAE

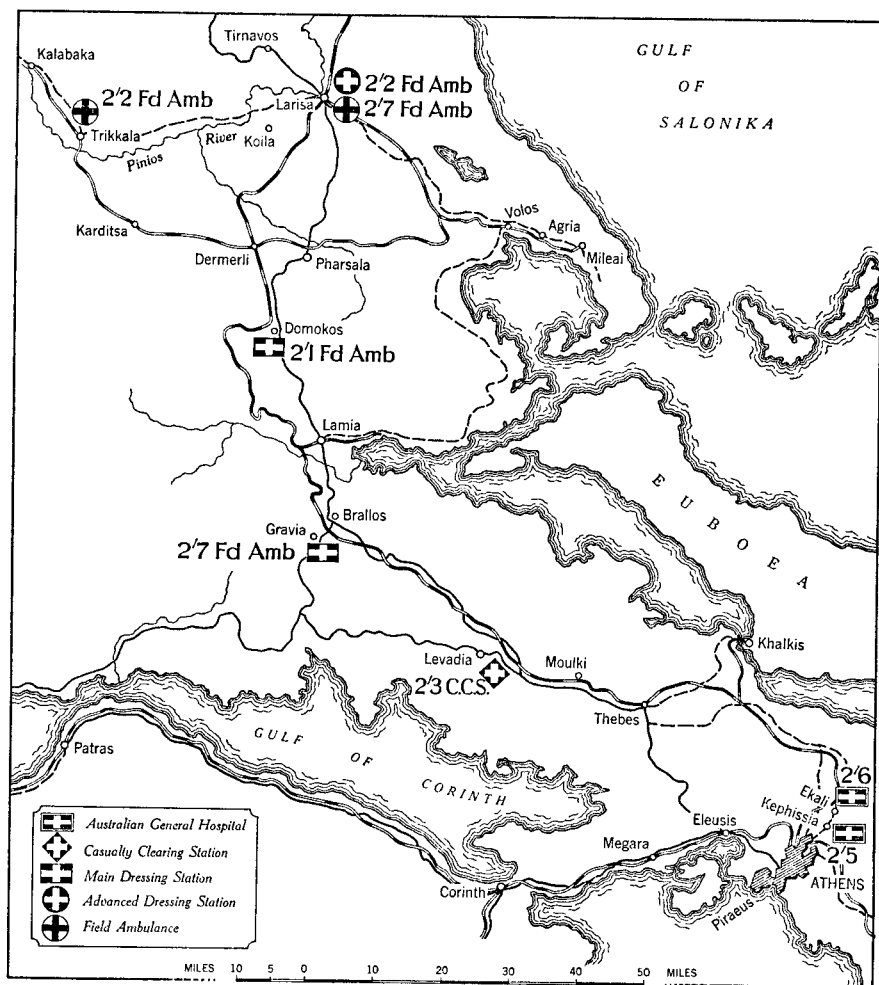
The 17th April found arrangements for the withdrawal of the line to Thermopylae well in order. On the left flank misty weather hampered the *Luftwaffe* in attacks on the forces holding their positions. In the centre Lee's force was in place at Domokos, Allen's force was in the Pinios Gorge on the right, the 4th New Zealand Brigade was clear of Servia and the 5th had left Larisa. The 2/7th Field Ambulance, greatly to the satisfaction of its staff, now received orders from Large to move forward, and, leaving the Athens area once more, pressed on and opened a main dressing station at Gravia, south of the Brallos Pass and an advanced dressing station near Larisa. Some ambulance cars had gone forward previously to work with the M.A.C., and the unit convoy also took quantities of medical and Red Cross stores for the medical units farther north. Little could be told them at base of the state of affairs forward; the whereabouts of units and their destinations were unknown. The role of this ambulance at present was to provide for casualties which were expected to be heavy as the troops came back over the passes to take up the Thermopylae positions.

At the corps headquarters, east of Elasson, it was felt that as Allen's force would be under control of the New Zealand division this formation should supply medical attention. This was arranged with Colonel H. S. Kenrick. Later it was found that Colonel Disher had arranged for Major I. H. Sender with a party from 2/1st Ambulance to form an A.D.S. for this purpose, and Colonels Johnston and Kenrick agreed that the latter could attach any New Zealand personnel necessary to this party. The various headquarters were now moving at short notice, owing to the rapidly altering situation, making communications and contact difficult.

PROBLEMS IN THE CENTRAL SECTOR

The 2/2nd Field Ambulance started to move to a staging camp at Larisa with 17th Brigade headquarters on the 17th, but was delayed by the blowing up of a bridge. At Larisa an unpleasant surprise awaited the party, for the British 24th Casualty Clearing Station to which they had been evacuating patients was found abandoned. The A.D.M.S. of the area had gone and no guide or instructions could be found to enlighten them where casualties were to be sent. Just then a corporal of the British Army Service Corps with five 3-ton trucks arrived, also looking for the casualty clearing station. After some argument he was constrained to join the

convoy and, after having collected blankets from the C.C.S. area was sent, not to Athens as had been intended, but to join the forward units in the convoys which had no ambulance cars. Meanwhile Major M. A. Rees with four officers and sixty men of the 2/2nd Ambulance, who had



Medical dispositions, 17th April 1941.

not accompanied the rest of the unit in the road convoy, had been trying to rejoin it by rail. Delays had occurred while a promised train was made ready in Athens and they only reached Demerli on the 16th to learn that there was no one at Larisa. Nothing could be found out about the location of medical units, until the personnel of the 24th Casualty Clearing Station were found at the now abandoned New Zealand hospital site at Pharsala. Patients were still being evacuated by this route and on the next day, 17th,

Rees' party loaded 130 patients into a hospital train, only to find that train crews and station staffs were rapidly leaving south on locomotives. The retention of a crew on the hospital train was assured by mounting a guard. In order to try to obtain a locomotive for another Greek ambulance train which was waiting, the field ambulance party went on to Domokos on the full train, and contrived to raise steam in a locomotive there. With an ambulance private stoking, Rees drove the engine to Demerli, only to find that a train had been commandeered by a field regiment and driven off with the extra coaches attached. Rees and his party were now stranded, and as trains were being fired on they set out on the thirty mile journey to Brallos Pass to look for their unit or join the nearest medical unit.

This experience was only part of the confusion which was associated with the move from Larisa. The position was particularly unsatisfactory with regard to the clearing stations. The 2/3rd C.C.S. which was left making its way from an area south of Larisa ultimately reached the selected site two miles east of Levadia. Here three sets of instructions reached the unit; in addition to the corps instructions, a direction came from Major J. B. Bunting, D.A.D.M.S. force headquarters, to move to the Thebes-Khalkis road, and one from A.D.M.S. advanced force not to go farther back but to set up farther forward. However, at midday on the 17th, these confusions were resolved by a definite order from Johnston and the unit, now all together, began to set up near Levadia. Brigadier W. Bridgeford, D.A. & Q.M.G., and Colonel Johnston, anxious to have beds ready as soon as possible, told Belisario that he was required to have accommodation for 100 casualties that evening, and that as the 24th Casualty Clearing Station and the New Zealand hospital had moved without their equipment he must be prepared to admit and hold patients until their evacuation was arranged. The unit began to set up wards and operating theatre at once; that evening 200 casualties were admitted, at one stage the staff were obliged to erect tents over some of the patients.

The position regarding the 24th Casualty Clearing Station was unfortunate. Whether through lack of specific written instructions or misinterpretation of verbal messages sent by Alexander, Lieut-Colonel F. R. Mollan, the commander, was in doubt as to what he was to do. It was thought at the time that the Germans were close on the left flank, and the plan was that the unit should withdraw after evacuating its casualties, but that if a considerable number of patients were held, adequate medical staff to care for them should be left before withdrawing. As Mollan was able to send all his casualties to Demerli *via* Pharsala he sought confirmation of his withdrawal. Disher came in to see if he could be of assistance and being asked for guidance could not give a direction, as it was outside his command, but expressed the opinion that it was wise to withdraw. He advised that notices should be put up informing ambulances that the casualty clearing station was closed and directing them farther south, also that the provost staff should be asked to divert casualties. It was fortunate that military action over the few days before 17th April produced few Australian casualties, as the distance traversed by patients to a medical

unit able to hold them might have created a critical situation. On the New Zealand evacuation line there was temporarily no provision for carrying out adequate surgery between the main dressing station of the 5th New Zealand Field Ambulance and the casualty clearing station south of Lamia, a distance of 130 miles, or on the 6th Division's line of withdrawal, the 2/1st Ambulance main dressing station at Domokos. As it happened the field ambulances were able to cope with the situation.

The 2/5th Hospital had now 100 beds ready at Kephissia and was rapidly expanding. Part of the staff of the 2/6th was meanwhile concentrated at Ekali near Athens. Still not satisfied that his equipment could not be saved Money sent a party back to Volos to enquire. A naval picquet had been promised to guard the cases, but this had not been provided and it appeared that the villagers of Agria, fearing that they could not risk being found by the Germans with British equipment allegedly in their keeping, had thrown much of it into the sea. Some stores were salvaged by the Greek police and placed in an olive store, but this was pillaged. However, following a proclamation by the Greek Army headquarters, stolen equipment was returned and locked up by the police. The salvage party was actually able to recover tents, tables, X-ray and some technical equipment, suffering from immersion to some extent, but still of considerable value. Some of the stores which had not reached Volos were also recovered, and were later landed at Eleusis Bay. The *Bantria*, carrying patients and orderlies, was safely on its way and was soon expected at Piraeus.

THE INEVITABLE DECISION

General Wavell arrived in Greece on 18th April and after consultation with General Wilson, agreed that no further purpose was served by the British and Dominion troops remaining in Greece. The possibility of this fateful decision had been foreseen for some time, and a Middle East Joint Planning Committee had been examining the position and drawing up plans for emergency. A naval expert was made available to Wilson, to whom the date of evacuation and other details were left. The decision was of course at this stage highly secret. The 18th was the critical day of the campaign. The fate of two of the rearguards, the 6th New Zealand Brigade at Elasson and the 17th Australian Brigade on the Trikkala road, and of those other forces that had not yet reached the Thermopylae position, depended firstly on whether Allen's hastily assembled force could hold on until dark in the Pinios Gorge, and secondly on steady movement of traffic along the crowded Larisa-Lamia road. At one point, south of Larisa, the road had been so badly damaged by a German bomb that a long line of traffic was stationary under air attack for several hours, but a fine effort by engineers and others opened the road before evening, and traffic began to move fairly smoothly southwards. Allen's force held the enemy in the Pinios Gorge till late afternoon. Two battalions were forced off the road into the hills, and a third fought two rearguard actions between Tempe and Larisa, which the Germans did not enter that night. A German

force astride the road north of Larisa forced the surviving Australians and New Zealanders to take a very bad track east of the main road.

The transfer of the weight of the German attack from the left to the right flank necessitating these sudden changes of plan at this stage, added greatly to all the difficulties. The 21st New Zealand Battalion, 2/2nd Australian Battalion and other troops there had been engaged in heavy fighting and sustained some losses. Air attack was intense along all the roads at this time and anxiety was felt concerning evacuation of wounded. Despite these difficulties Kenrick on 20th April thought all New Zealand sick and wounded had been brought back. Aid posts of Australian and New Zealand units were used by troops of both Dominions, 420 men passing through the New Zealand field ambulances in this engagement. Arrangements for attention by the 2/1st Ambulance at Domokos saved the necessity of unduly long evacuation routes for wounded New Zealanders after the 24th British Clearing Station had closed at Larisa. Johnston found it best during the latter stages of the withdrawal to use his motor ambulance convoy cars by attaching them to staging posts rather than to field units. This allowed the ambulance convoy to make contact with the New Zealand division and stretchers and blankets were taken forward from the reserves held at the 2/3rd Casualty Clearing Station.

General Burston, following General Blamey's direction, embarked for Egypt on 18th April in the *Port Halifax* later transferring to H.M.S. *Carlisle*. Before leaving he ensured that all arrangements were in order for the embarkation of all the nurses on the hospital ship next day. He visited Colonel Kay at Kephissia and told him he was now the senior officer of the Australian medical services in Athens, to whom Major Dunlop would refer in matters of difficulty.

THE REARGUARD ACTION

By dawn on the 19th the crisis had passed. During the night the 6th New Zealand Brigade and Savage's force had passed through Larisa, and early next morning were well south of that dangerous bottleneck. The scattered parties of Allen's force were making their way south, some in their vehicles, some on foot. The rearguard was now Lee's force at Domokos and the 6th Division, less the units at Domokos, was on the Brallos Pass or on its way there. On this narrower front Disher and Kenrick agreed that full use was to be made of Australian and New Zealand medical posts for either's casualties.

The 2/7th Ambulance had a busy night on the 18th/19th. Their main dressing station was established at the junction of the Brallos and the main west coast roads, and an advanced dressing station near Lamia, under cover of some plane trees. The latter site was too near a bridge, and owing to the risk from the air was moved. The previous day seven ambulance cars, a gift of the "Friends" to the Greeks arrived with a staff of three officers and fourteen men in charge of Mr Dick and were attached. The main dressing station was equipped with an operating and

resuscitation centre with a small blood bank organised by Captain P. H. Macindoe from local donors and sent on patients to the 2/3rd Clearing Station from a neighbouring siding. During the night casualties had arrived in a steady stream, mostly men wounded in the Pinios action or on the roads. Disher thought that the position of this station was unsafe, for in spite of showing a red cross it was near a road and rail crossing, a siding and bridge, and he advised that it should be moved. Unfortunately before this was done there were further heavy air raids on the morning of the 20th, in which two men of the M.A.C. were killed. News was received that Captain J. A. F. Flashman of the 2/1st Field Ambulance acting as R.M.O. to the 2/3rd Battalion had also been killed during the 16th Brigade retirement from Tempe Gorge.

The 2/1st Field Ambulance, though separated for a time from some of its members detached on duties in other areas, was now running its main dressing station south of Domokos on a fuller scale than had hitherto been possible during the campaign. Two surgical teams were working, though only the most urgent operating was done, for evacuation had always to be kept in mind. Here for the first time in Greece the unit displayed a red cross. In view of further imminent withdrawals, as many vehicles as possible were sent south, keeping all the motor ambulances. Selby took three ambulance cars forward of Larisa to collect wounded on the 18th and brought them back full. On the return journey great traffic congestion was encountered, made worse by air raids, but fine work was being done at great personal risk by the provosts, without whose tireless efficiency many men and vehicles could not have come through. The dressing station was run with a section only of "B" Company. After dark part of the unit began to move on with some officers and men of the 2/2nd Field Ambulance, whose packs were carried for them as they were marching. The situation on the road near Domokos had some curious features. Colonel Russell went ten miles forward to see to arrangements for the wounded, and left the R.M.Os. with control of ambulances at the posts, to aid them in the impending withdrawal. The journey took nearly all day; many vehicles were damaged by bombing, detours were frequent, owing to bomb craters, air attacks on the Brallos Pass persisted, and yet near Domokos some civilians, both men and women, were seen walking a few hundred yards behind forward infantry positions.

While Disher was visiting the main dressing station numbers of German planes flew low over the area, but made no attack. On the way he met some of Rees' train party making their way back on foot to the 2/7th Ambulance and was able to give them transport. By this time the 2/3rd Casualty Clearing Station was working at high pressure with an operating theatre established, and during the day received welcome offers of assistance from Lieut-Colonel Mollan and his staff. His unit was unfortunate in having to abandon all its heavy equipment, and the commanding officer by arrangement with Anzac Corps sent members of his staff with a truckload of equipment to the site of the Australian unit, where the staffs of the two units worked together. By midnight 299 admissions had been

handled in twenty-four hours, and at one stage up to 500 patients were in the unit lines, despite constant evacuation.

WITHDRAWAL OF NURSES

At Athens, on 19th April, all nurses of the 2/6th General Hospital were now on two hours' notice to leave. A hospital ship was expected, but it did not arrive that day. At very short notice the opportunity came to embark a number of medical units on a transport, including the 1st New Zealand General Hospital (less nurses and others attached), mobile bacteriological laboratory, mobile hygiene laboratory, the armoured division field hygiene section, the 2/1st Australian Field Hygiene Section and the Australian Red Cross representative, who was no longer able to render service as he could neither obtain stores by sea nor buy them locally. The nurses of the 2/6th A.G.H. should have been included in this move but, owing to short notice, missed the ship. It had been hoped too to send back to Egypt such stores of the 2/6th Hospital as were not needed by other units, but this could not be done.

The following day the hospital ship *Aba* arrived at Piraeus and the evacuation of the nurses of the 2/6th Hospital was ordered. Under escort of senior officers they proceeded to Piraeus but only Matron J. S. Abbott and twenty-four nurses were able to embark, as an air raid took place and the remainder had to return to Kephissia.

THE FINAL PHASES

On 20th April the withdrawal to the Thermopylae line was complete, except for scattered parties of the 21st New Zealand Battalion and the 2/2nd and 2/3rd Australian Battalions marching back through the hills. The 6th Australian Division was now united for the first time, and the A.D.M.S. also for the first time had his three field ambulances under his control. The military situation was still unstable. The Greek Epirus Army surrendered, not by order or consent of General Papagos, consequently the Greeks were unable to share in the new defence line. The greater dispersal of British and Dominion troops over this line inevitably lowered its strength and the continued defence which had been hoped for could not be maintained. The casualties occurring at this time were very few and were not due to action with land troops but to bombing and machine-gunning from the air. The German air force now had complete control, and by sheer numbers had neutralised air resistance. Air attacks began early this day with an assault on divisional headquarters. Captain S. I. Weir, R.M.O. of the 6th Divisional Engineers was mortally wounded at this time in a dive-bombing attack at the foot of Brallos Pass and died in the 2/7th Field Ambulance dressing station.

The members of the 2/1st Ambulance headquarters returning from their strenuous time with Lee Force, showed evidence of fatigue. Their role now was to form staging posts in the rear area along the road to Athens where they were certain to be wanted in view of the intense air activity. Disher, in visiting his ambulances, found the 2/2nd at last

assembled as a unit, having completed its work with Savage Force; fortunately few casualties had needed attention.

TRANSPORT OF CASUALTIES

The problems of the medical administrators were now more than ever centred on evacuation of sick and wounded. Though the concentration of the forces lessened distances, there were still considerable journeys to be made between posts and medical units. Further, the roads were becoming increasingly congested with the greater numbers of vehicles and the delays caused by air raids. The problem was not the extrication of casualties in limited numbers from difficult country as it had been earlier. It was now a matter of speed and safety in getting sick and wounded away from the 2/7th main dressing station and the 2/3rd C.C.S. Rail evacuation, in spite of criticism, proved a practical method. In the later phases of the campaign difficulties had been met, but in spite of this rail movement had played a very useful part, particularly in the New Zealand sector, even though rail transport ceased to be practicable there after the 16th. Fifty wounded men were moved on from the 2/7th main dressing station on the 19th and, in spite of occasional blocking of lines from bombing, this encouraged further efforts. There was a certain reluctance in force headquarters where it was felt that lines might be destroyed as quickly as they were repaired.

Dunlop visited corps headquarters and discussed plans for ambulance trains. Owing to the virtual impossibility of any regular and accurate information being obtained at force headquarters about locations of forward medical units and movements, ambulance trains had been sent forward from Athens with general instructions to the staff to go as far as possible and use initiative in making contact with units. A coordinated plan was now adopted by which advanced headquarters of British Troops in Greece called forward the trains according to the needs expressed by D.D.M.S. Anzac Corps. A shuttle system was used with three trains between Athens and Thebes. Evacuation was carried out chiefly at night, as both railways and roads were receiving constant attention from the enemy during the day. In fact Dunlop, in visiting Crellin to discuss the matter, finally located him on the road returning from corps headquarters, and the circumstances were such at the time that it was wise for them not to prolong any conversation on the road. One train was planned to be at Moulki loading, one at Thebes and one waiting at Athens. Troubles occurred with these trains as might be expected. Seriously ill patients could only be taken on a train with corridor coaches, and such facilities were limited. An ambulance train liaison officer was appointed, Lieutenant Herford, R.A.M.C., who did valuable work in meeting the needs of evacuation by using one or other of the methods possible according to circumstances. Unfortunately this work was for a time hampered by the theft of the motor bicycle he was using. On one occasion bombing of the line near Athens necessitated taking the patients out of the train and sending them on to Kephissia by lorries and ambulances. But nonetheless

the use of trains was a success and saved the motor ambulance convoy considerable journeying and strain. The number of patients moved rose till on the day and night of the 22nd/23rd April 287 casualties were moved from the clearing station to hospitals at Kephissia.

Transport of the sick by road was exceedingly difficult during the day, and even more difficult by night, though the lessened congestion of the roads at this period, and night driving with lights, greatly assisted movement. At first road convoys moved without lights but as the rearward movement of troops intensified, and owing to the state of the roads, the nature of the country with steep defiles, precipitous slopes and sheer cliffs and the press of traffic, this precaution was subsequently abandoned. The headquarters of the motor ambulance convoy kept in close touch with the clearing station and was able to balance the number of cars needed by the various field ambulances. On the night of the 21st a large convoy of nineteen M.A.C. cars, together with other cars supplied by 168th Light Field Ambulance and lorries supplied by the Deputy Director of Supply and Transport of Anzac Corps, Brigadier D. D. Paine, took patients right back to Athens. Some anxiety was felt by Kenrick of the New Zealand division about supplies of M.A.C. cars for evacuation from the New Zealand field ambulances, but Johnston thought it better not to attach ambulance cars to the forward medical units but instead to establish a staging post at Livantes and to direct the motor ambulance convoy to keep in close touch with the needs of the New Zealand units.

ORDERS FOR WITHDRAWAL

On the 21st the final decision to implement plans for the evacuation of Greece was made by General Wilson. The original date chosen for the beginning of the embarkation of the main bodies was the 27th, but this was advanced to 24th/25th April. General Blamey expected that a determined effort by the enemy would take place then, possibly with the intention of attempting encirclement of a large body of troops, largely Australian and New Zealand, on Anzac Day. On the following day instructions were given to the various formations and units that Greece was to be evacuated. The immediate medical policy of Anzac Corps was as follows:

2/3rd C.C.S. was to evacuate as many patients as possible on the night of 22nd/23rd April, to cease receiving patients on 23rd April at 1400 hours, and to withdraw, completing the movement at 2000 hours that night.⁴

24th C.C.S. was to accompany the patients who were evacuated.

The M.A.C. was to clear all the M.D.Ss., to distribute cars to the 2/7th Field Ambulance and the New Zealand field ambulances, and to accompany 2/3rd C.C.S. with its remaining cars.

Evacuation was to be by train as far as possible, but if not thirty lorries would be provided for road transport.

Further details of movements were left to the A.Ds.M.S.

⁴ This order was not received by Lieut-Colonel Belisario, but he had already sent on all the patients on his own initiative.

After the movement of the C.C.S. all casualties would be sent back to Athens direct, but it was insisted that as many as possible would be evacuated with the troops.

Two ambulance trains were available, and their staffs accompanied the casualties.

The following message was received from D.D.M.S. Corps and passed on by Disher to the Australian ambulances:

1. The 4th and 168th Light Fd. Ambs. are each setting up posts on beaches west and south of Athens; by 24th/25th April will establish M.D.Ss. if necessary also.
2. There will be two collecting points, one on each main beach area.
3. It is unlikely that after 24th/25th if any casualties are evacuated to Athens conducting personnel will be able to return, and as few cases as possible will be sent through.
4. Subsequently every effort will be made to embark all possible casualties on to transports.
5. Forces are considering possible necessity of leaving medical details from these units behind if circumstances demand.

Detailed plans were issued during the day of 22nd April. The 2/1st Ambulance was detailed to move that night with a mixed Australian and New Zealand covering force. The 16th and 17th Australian Infantry Brigades were to move back on the following night, 23rd, and would be accompanied by the 2/2nd Field Ambulance, under Brigadier Allen's command. The next night the 2/7th Field Ambulance was to accompany the 19th Brigade. Field Ambulances were instructed to take as much medical equipment as practicable, especially dressings. Ambulance cars were distributed through the convoys. During the day these arrangements proceeded, and later in the afternoon a heavy thunderstorm broke over the divisional areas. It was hoped that the German aerodromes would be thoroughly wet.

FINAL MEDICAL PLANS

A tentative plan was drawn up for the evacuation of the 2/5th A.G.H. Considerable discussion took place between British force and corps medical headquarters as to the policy to be adopted about the two general hospitals. It was decided that parts of these hospitals should be left to look after seriously ill men and those sick and wounded who would come in later from troops previously cut off from their fellows, or who had not reached the evacuation beaches in time. The plan was to leave portions of each hospital with the commanding officer, a proportion of medical officers and nurses and a considerable number of orderlies. In the case of the 2/5th A.G.H. the evacuation was originally planned in four flights, the first being the nurses, the next two the senior and key personnel, the remainder staying till all wounded were evacuated if possible. Some portable equipment was to be taken.

Australian military opinion in Greece was definitely against leaving any nurses. General Burston had expressed this opinion in Greece before he left, and on his return to Alexandria he interviewed General Tomlinson, D.M.S. Middle East, and asked him to advise the Commander-in-Chief

that the Australian Government would expect everything possible to be done to take off the remaining nurses. This view was also voiced by General Blamey. The *Dorsetshire* hospital ship was expected, and was to be used for the transfer of sick and wounded and nurses. Greek ships which might have been used had been sunk. There were 800 lightly wounded men, part of the 2/5th and 2/6th Hospitals, 26th General Hospital and patients of other units to be taken off. In the Athens area there were still 26 hospital officers, 342 other ranks, and 154 nurses.

General Christopoulos, D.M.S. of the Greek Army, called on Brigadier Large and promised that the Greeks would give all possible help to wounded British soldiers left in Greece, but so great was the strain on accommodation, and so short the supply of medical stores that little use could be made of this offer. Misunderstandings occurred over trains and ambulance cars to move patients from the C.C.S. Mistaken orders to the car drivers caused delay; these were rectified by Dunlop, but unfortunately advice had been received from advanced headquarters that trains would not be wanted. The general plan of evacuation was now clear. Under cover of darkness groups approximating to brigade groups were to be lifted from the beaches. Men were drafted to selected areas at each beach and were to embark on small vessels. Movement would be made on three nights, 24th/25th, 25th/26th, and 27th/28th April, the beaches used were to be those in the vicinity of Marathon (Rafina, Porto Rafti and Lavrion), those in the Corinth area, one east of Megara, and Tolos and Navplion in the area of Argos in Morea. Other beaches later chosen in the Peloponnese were Monemvasia and Kalamata.

The night of the 22nd was very dark. The roads were choked with vehicles and troops, and convoys from the covering force falling back on the Thebes pass seemed endless. The soldiers bound for the beaches passed many Greek soldiers on the way; few had either weapons or rations, and they looked hungry, exhausted and depressed. The next day most of the patients having been sent on, 348 in all for the day, from the 2/3rd Casualty Clearing Station, the unit closed. The men were told to move about as though carrying out ordinary duties. All equipment and tents were left undamaged. After dark the motor ambulance convoy led off followed by the casualty clearing station, and before leaving the site Belisario left a message in German on the red cross in the centre of the camp thanking the German air force for their observance of the Geneva Convention. Shortly after the unit had set up on this site German planes came over and the last plane, flying low, dropped diet sheets which had been left on the site at Elasson. Even when bombing was taking place in the surrounding area the unit was never molested, though Belisario found it necessary to ask neighbouring units not to fire machine-guns at German planes from just outside the clearing station area.

DEPARTURE OF NURSES

Meanwhile at Kephissia Large had instructed that the original plan of the 2/5th Hospital would be changed. During the day of the 23rd forty-

four nurses and nine masseuses left in charge of a senior sister. The hospital was warned to be ready for large numbers of casualties should these occur at the beaches. Large and Johnston conferred and agreed that Colonels Kay and Popham, the commanding officers of hospitals, should not stay, but be sent off because of the value of their great experience. Large still thought that some nurses should stay with the hospitals, forty-two British and forty Australian, these being the remainder not in the party which had already left. The reasons for this were the needs of patients and the dangers and difficulties incidental to embarkation. The Admiral in charge of sea transport advised that the nurses should be sent on a hospital ship, but naval opinion now was that a hospital ship might be sunk, and as an alternative suggested evacuation on a destroyer. All the nurses were willing to stay, but a tentative decision was made that the remaining nurses should be divided into two parties, sending out if possible as many as could be spared. Blamey, however, before the headquarters party left by air for Egypt, gave a definite instruction that all the nurses were to be sent back. Final arrangements were then made for the continuing of the work of the 2/5th Hospital by a party remaining in Greece, and members of the unit were assigned to this duty by Colonel Kay. A number of officers volunteered for this duty, but the decision as to who should remain was the responsibility of the hospital commanders.

The remainder of the nurses were now concentrated and awaiting events. The officers and nurses of the 2/5th Hospital had lunch together, using the special mess equipment which had been presented to the officers of the unit. On the afternoon of the 24th Kay and Popham, under instructions from Colonel Fulton, A.D.M.S. of the sub-area, went to Piraeus where the *Neon Hellas* was embarking wounded and others. The process of moving the patients in barges and on to the ship was extremely slow. Late in the afternoon embarkation ceased for an air raid warning, and the ship was hit by a bomb from a dive-bomber. Kay and Popham were both injured. Popham sustained slight injury only, but Kay was mortally wounded and died some days later in the 26th Hospital. There was no protection against aircraft and no medical equipment to hand, but a party from the 2/5th Hospital established an aid post and men under Lieutenant D. J. Arbuthnot of the Australian Army Service Corps cleared wounded from the ship which was still under machine-gun fire and burning. Later a suggestion was made that the two hospitals should amalgamate, but at a conference arrangements were made to coordinate the reception of wounded and to keep the hospitals distinct. This was in accordance with Colonel Kay's wishes.

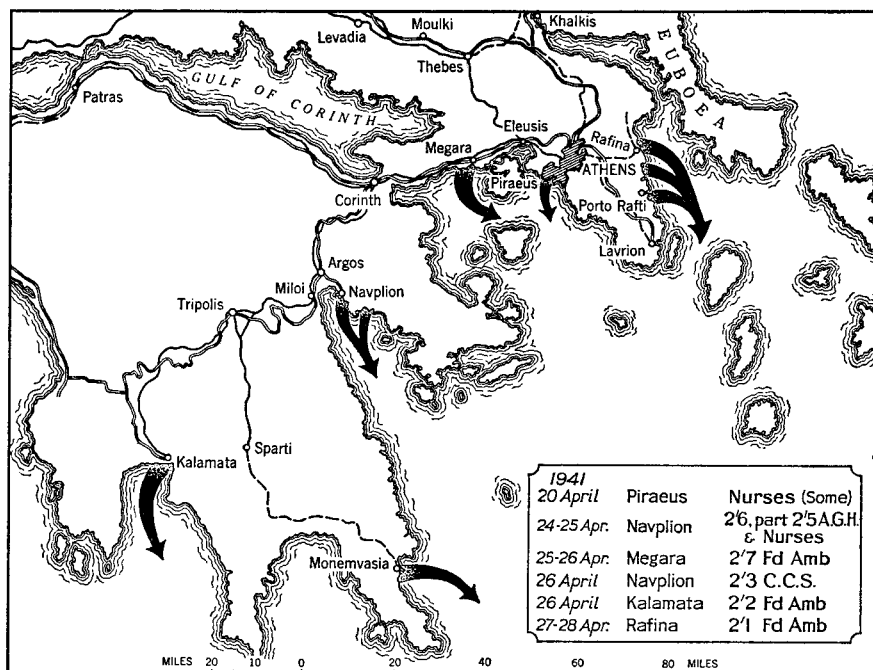
Part of the staffs of the 2/5th and 2/6th Hospitals had already left for embarkation from Navplion in the Argos area. The first party left on the 22nd at 5.30 a.m. with such personal belongings as they could carry. They travelled by goods trains to Theodora with other troops, where they sheltered in an olive grove till night. After crossing the Corinth Canal by punt they sheltered again in a pine forest, and later picked up trucks which took them some thirty-five miles over roads impeded by

craters and wrecked vehicles. At Navplion they joined the party which had left later. The remaining nurses of the various hospitals left late at night on the 23rd in the care of Lieut-Colonels V. M. Coppleson and C. G. McDonald of the 2/6th Hospital and Captains E. G. Sayers and R. D. King of the 1st New Zealand hospital. The Australian nurses in this party were under the immediate administration of Matron K. Best, of 2/5th A.G.H. They travelled in 3-ton lorries and crossed Corinth Canal, making for Argos. They sheltered in fields and in a cemetery at Argos during the day, and though planes constantly attacked the neighbourhood no damage was done. Some of the doubts expressed by Brigadier Large concerning the risks of a journey to embarkation beaches were well-founded during this trip. Road travel through Megara towards Corinth was very slow, the vehicles having to negotiate obstructions such as bomb craters, dead horses and donkeys, overturned trucks and vehicles filled with Greek refugees. Fortunately the nights were moonless and not cold and there were no night sorties by the *Luftwaffe* which might have been destructive on the beaches and on roads like the last long straight run to Navplion, with little cover for the troops who thronged them on the way to the ships. All the medical and nursing personnel arrived safely, though the aerial activity during the day was considerable, the only casualties being four New Zealand nurses who were in a truck which overturned on the road. They were not seriously injured, and after being brought on in ambulances were able to embark with the rest.

THE NIGHT EMBARKATIONS

On the night of 24th/25th April the embarkations from Navplion included a number of medical units, 2/5th and 2/6th Hospitals, with the remainder of the nurses then in Greece. Lieut-Colonel A. W. Morrow, who was in charge of the 2/5th Hospital party was notified that they were to board H.M.A.S. *Stuart*, but this was altered later. Some embarked in *Voyager* and others in H.M.T. *Ulster Prince*. This transport went aground; fortunately only few troops were on board at the time. The mine-sweeper corvette *Hyacinth* which took off some of the divisional headquarters staff, tried to tow off the vessel but was unsuccessful and only with difficulty released a fouling rope from her own propeller. The nurses were to have travelled on this transport, but were embarked on a Greek caique and boarded the *Voyager*. This was accomplished safely, the only mishap being that a British nurse fell in the water. Colonel Money with the 2/6th Hospital, on arrival at the wharf at 10.30 p.m., found the *Ulster Prince* aground, but the bulk of the unit left on H.M.S. *Phoebe* an hour later. Money and some of his staff, with thirty stretcher bearers, remained to load equipment and casualties from air raids. Arrangements had been made for aid posts convenient to the troop concentrations and the docks; luckily casualties were few. The misadventures with the equipment of the 2/6th Hospital continued to the end in spite of Money's strenuous efforts to save it. As told earlier, he did not succeed in having it taken in the *Bantria* at Volos, and no persuasion or even bribery

could obtain local help with small ships. The *Bantria* could have taken it to Egypt had loading been permitted and even when 200 tons of cases arrived at Eleusis Bay, they were unloaded and sent to Ekali, where most of it had to be left. Finally the grounding of the *Ulster Prince* removed the last hope of saving it, and only a quantity of surgical instruments, and



Evacuation beaches.

some panniers of medical equipment and stores could be manoeuvred on to the last boat load. All the patients were embarked safely. One small party embarking with these units was that of the Friends' Ambulance Unit, who during their attachment to the 2/7th Ambulance had worked with great devotion. They had escaped imprisonment in the Finnish campaign, and some concern was felt that their position would be anomalous if captured, as they were not an army unit.

In the small hours of the morning of 25th April the 2/3rd Casualty Clearing Station assembled at Navplion, and dispersed under trees. An advance party had opened a dressing station a little along the Argos road, using equipment from the 189th Field Ambulance and during the daylight hours found that a red cross on top of an ambulance in the centre of the field was respected by enemy airmen. The grounding of *Ulster Prince* made further embarkation impossible that night. Belisario was placed in charge of medical arrangements for the area. An aid post was set up by the 24th British Casualty Clearing Station and another



Meal parade, Elasson, Greece.

(J. C. Belisario)



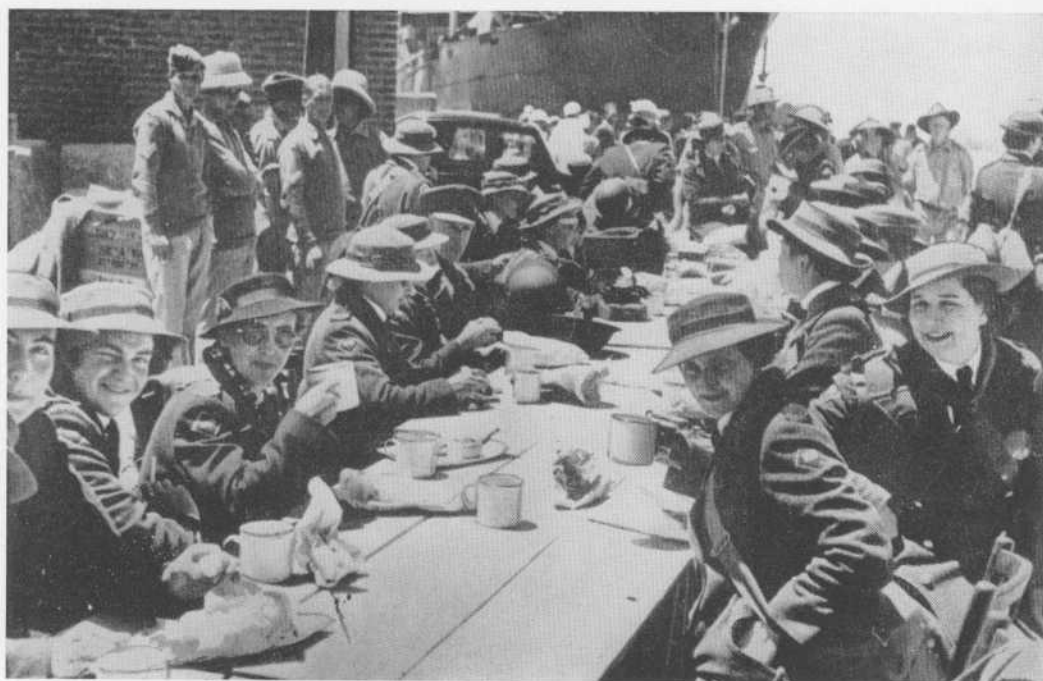
Motor Ambulance Convoy personnel evacuating wounded at Levadia, Greece.

(J. C. Belisario)



Nurses awaiting evacuation from Greece.

(A.A.N.S.)



Nurses served with refreshments on quayside after their return from Greece.

(Sydney Morning Herald)

by the 2/3rd along the Argos road: to these units were assigned the care of the British and Australian troops respectively. The men spent the day of the 26th dispersed under any available cover. Large and Dunlop arrived later and an aid post was established on the wharf to deal with any possible casualties. Officers volunteered for aid post duty and medical orderlies from both casualty clearing stations were selected. Conferences were difficult to hold by reason of the great air activity, and indeed a definite risk was taken in assembling the senior officers in the area in places like a barn where a single hit might have had serious results. The *Ulster Prince* had been fired by air attack during the day, and the light from the burning ship shed an unwelcome glare over the embarkation area. The men marched to the water in threes, in enforced silence, and no smoking was permitted. Most of the staffs of the casualty clearing stations and 189th Field Ambulance embarked in H.M.S. *Calcutta*, a cruiser taking part in her fourth evacuation—Norway, Dunkirk, Somaliland and Greece.

Belisario who remained with Captain H. I. Turnbull, A.A.M.C. and Captain A. C. Rumsey, R.A.M.C. at the aid post found the lying sick and wounded were still assembled on the wharf, and was told they could not be taken off. By perseverance and endurance on the part of the men most of the patients were induced to walk, and in twos and threes they embarked on small boats as though they were unwounded and were taken to the transports. Belisario prevailed on the embarkation officer to take the few remaining lying patients on the last boat to leave the pier. It was realised that if such men were not embarked then they would be left to the risks of exposure as well as capture, as the chances of leaving from a beach relatively close to Athens after the third night of the general evacuation would be slender. The attitude of troops awaiting embarkation was exemplary as they stood aside to a man to let the stretchers bearing the wounded pass slowly through to the last boat.

Meanwhile movement had been proceeding from other beaches. The 2/2nd Field Ambulance had been instructed to move with the 17th Brigade, and travelled by Corinth and Argos to an olive grove west of Miloi Bay, and thence by Tripolis to Kalamata. The men, after leaving the lorries, marched to the beach. Motor transport was then ordered to return to the bivouac site to be destroyed. In accordance with the terms of the Geneva Convention motor ambulances were left intact. Medical equipment which could not be taken off was left. Late on the 26th, Salter's ambulance was trans-shipped from a destroyer to the *Costa Rica*. Next day a near miss from bombing by attacking aircraft damaged some plates of the transport. Destroyers took off all on board before the vessel sank and disembarked them at Suda Bay.

The 2/7th Field Ambulance had moved off on the night of the 24th and early next morning reached Megara, where the men dispersed among olive trees, with over 3,000 troops. A beach post was set up and some twenty badly wounded men found under the trees were sent by ambulances to the 26th Hospital. Only portable equipment could be taken, and

officers and medical orderlies carried dressings and other essentials in haversacks. During the night of the 25th and the early morning hours of the 26th the troops embarked in five groups.

The last Australian medical unit to leave was the 2/1st Field Ambulance. It had been acting as part of a covering force holding the Erithrai Pass, while other troops moved south. The unit was there widely dispersed in a well watered area in a long valley, with a detachment of the 4th New Zealand Ambulance, under directions of the 4th New Zealand Brigade. On the 24th casualties were sent to Athens by ambulance and, learning that the 26th and 2/5th General Hospitals were still open and receiving sick and wounded, Russell sent more ambulances during the day, and also a lorry filled with medical stores. All portable equipment was divided between the officers of the ambulance, and all officers and some other responsible men carried syringes and morphia. Some annoyance was experienced from pilfering by local inhabitants who were collecting discarded material.

LAST MOVEMENTS FROM THE BEACHES

On Anzac Day, 25th April, movement was further postponed, and rations for five days and petrol for 200 miles were issued. Plans were now changing with great speed. A further change was made on the 26th, and Rafina, known as "A" Beach, one of the group east of Athens was now the destination. Rumours of paratroops near Corinth were current; these were founded on fact and communication with the Peloponnese was now severed. That night the troops moved towards a blacked-out Athens, and Russell found it necessary to lead his own unit as in the difficulties of proceeding without lights the leader was lost. The beach was reached but no evacuation was possible, and the men dispersed carrying only packs, groundsheets and blankets. The ambulance formed a dressing station a mile from the beach. On the 27th all vehicles were rendered unserviceable except motor ambulances. All medical equipment was left intact, but suffered considerable losses from depredations of some civilians who stole even the men's blankets while they slept. This conduct was at variance with the general attitude of the Greek people, who were cooperative and often actively helpful to the troops during the final stages of the retirement.

Some casualties arrived through the day: an attempt to send them to the 2/5th Hospital was unsuccessful, but arrangements were made to include twelve men on stretchers in the embarkation. Still more arrived a little later. That evening, with great difficulty, all the sick were taken to the small jetty where two fishing boats were taking off the men. Troops thronged the roads, thus complicating the journey of a truck carrying wounded. Seventeen men lay on stretchers on the pier: two died while there. Then it was found that no stretcher cases were to be embarked. All but seven were converted to "walking cases", and although most of them were severely injured they got away by being carried in the standing position by the support of a soldier on each side. The remainder simply

could not do this, having fractures of the lower limb or abdominal wounds. When all troops had been embarked Captain Playoust went on board H.M.S. *Kimberley* and found there was still room, and as the final boatloads were not full gained permission to take the men on stretchers in the last boat. The embarkation officer allowed troops to come back and handle the stretchers; after they were loaded a belated party of men arrived, and the overcrowded boat went aground. It was successfully pushed off and finally embarked; the convoy of ships left in the small hours of the 28th April, and safely arrived at Suda Bay, in Crete. The Germans had entered Athens at 9.45 a.m. on 27th April.

So ended the organised evacuation of Greece. Though small parties of men managed to escape later, after various adventures, the Australian medical story ends here, except for the work continued by the detachment of the 2/5th General Hospital under Major Brooke Moore. This is described in Chapter 19.

MEDICAL ASPECTS OF THE CAMPAIGN

Before following the fortunes of the forces in Crete, it is well to consider some medical aspects of this brief difficult campaign.⁵ At the beginning there seemed to Generals Dill and Wavell a reasonable prospect that Greece might be defended from invasion, though the venture was, as Wavell afterwards said, somewhat of a gamble. Doubts were really felt from the start, as is shown by the early consideration of arrangements for a possible retirement, yet a plan which included six general hospitals in Greece showed not a little optimism. Greece was not another Western Front in France in 1916-1918, and the semi-permanency of large medical units in that phase of the previous war could not be repeated. On the other hand it was fortunate for the medical arrangements that the operations consisted of a series of rearguard actions in which, owing to their very nature and to the skill with which they were conducted, casualties were few.

Soon after the fighting began it became evident that the greatest medical difficulty in Greece was not that of environment, even on the snowy mountain passes, or of limitations of staff or equipment, but the lack of communications. The obscurity often surrounding the position of medical units added greatly to anxiety, for efficient handling of the sick and wounded has a great effect on morale. Further, the establishment of subsidiary areas of medical command under existing conditions, instead of linking the base and forward areas, sometimes increased difficulties and caused confusion. This was due in part to the relative isolation and poor communications.

In addition, delegation of responsibility between different authorities was never satisfactorily solved in some respects. This was well illustrated in the control of the British and Australian casualty clearing stations. Colonel Johnston pointed out in his report to the D.M.S., A.I.F. that,

⁵ Australians in Greece: disembarked 17,125, killed in action 208, presumed dead 38, died of wounds 74, wounded in action 494, prisoners of war 2,030. Total battle casualties 2,844.

though the 2/3rd Casualty Clearing Station was allotted to the corps and was by direction of Brigadier Large placed under corps administration, "having been sited by force headquarters within a base sub-area, the influence of both these organisations still appeared to envelop it". The anomalous position has already been mentioned which arose when both the casualty clearing stations were closed and sent back, one with loss of equipment, at a time when two hospitals were also hastily closed. As pointed out above, the sudden deprivation of three out of four medical holding units (24th British C.C.S., 2/6th A.G.H. and 1st New Zealand G.H.) imposed a dangerous burden on the field ambulances and motor ambulance convoy that they might not have been able to sustain. This burden was increased by the fact that at this time the 2/3rd C.C.S. was moving to a safer location and was therefore ineffective. Efforts were made both at the base and in the forward areas to strengthen the tenuous line of communication by personal contact with units, but the speed with which the situation changed could not always be matched by amended plans. The need for the D.D.M.S. of Corps to have a personal car allotted, though not officially provided, was recognised at once by the D.A. & Q.M.G. of Corps. Colonel Johnston was also forced for a time to use a despatch rider from the ambulance convoy for his own purposes.

The field ambulances rendered excellent service of all kinds, whether working as holding units or in small sections budded off from the parent stem, and retaining its essential characteristics. The 2/2nd and 2/7th Ambulances, much to their regret, were prevented from taking as active a part in forward areas as they wished, owing to those confusions and misunderstanding which hampered their movements. As in the Western Desert, the problems attending the attachment, movement, maintenance and work of surgical teams again arose. The dangers of immobilising main dressing stations of ambulances were apparent, and the need of transport was again emphasised. The greater mobility and elasticity of the light field ambulance showed the lines along which logical development might be expected to take place.

The casualty clearing station did excellent work; its early arrival and prompt establishment were factors of great importance in the campaign. During the campaign the 2/3rd C.C.S. admitted a total of 1,683 patients, and carried out a considerable amount of surgical work in a tented theatre, using a pressure lamp for light at Ellasson and a generator unit at Levadia. Many of the wounds were multiple, and limb injuries were common. At Levadia an urgent surgical ward was set up near the theatre. Standard pre- and post-operative methods were used, wounds were excised where possible, sulphanilamide paste was used locally and sulphapyridine by mouth. Actually this unit, as it happened, was of greater value than a hospital, but the conditions under which it worked showed clearly certain drawbacks inherent in this type of unit in modern warfare. Its relative immobility might easily have caused the earlier loss of its equipment, and even sub-division into sections was not an answer to these problems, unless adequate transport was available. It is small wonder that the D.D.S.T. was

dismayed when asked for fifty 5-ton trucks to move the 2/3rd C.C.S. The paucity of all transport was embarrassing in Greece, and the lack of intrinsic transport for this type of unit was felt. The strain on the male nursing staff was considerable; dispersal increased the difficulties caused by the inability to use female nurses. Johnston commented on the need for more trained male staff and for the necessity for an early decision whether nurses were to be used in these units or not in places without reasonable security. A semi-forward area may become a forward area overnight.

The value of early establishment of medical units was illustrated not only by the work of the 2/3rd C.C.S. but also by the 26th General Hospital. This latter unit took full advantage of having been in Greece for some months, and its influence and help were evident in many ways, including the provision of medical stores. The low priority given to advanced depots of medical stores was perhaps a good thing in Greece, as the loss of stores might have been even more serious, but this does not detract from the need for ample medical supplies at the start of a campaign. Preparations were not really adequate, and much essential equipment was still to come when the campaign ended, including that for blood transfusion, equipment for surgical teams and X-rays. The C.C.S. most of the time worked without any X-ray outfit. Package of stores in Australian medical units was faulty, and the need of standardised cases with screwed lids and rope handles was felt. Though the experiences of this campaign were unfortunate they showed the scale on which wastage might occur and the necessity for plenty of reserves.

The general hospitals had little chance to work, but light was shed on the question of siting these cumbersome units. Though the staffs of the 2/5th and 2/6 General Hospitals produced working wards in a remarkably short time once their equipment was on the selected site, the huge weight of material could not be transported easily or quickly under existing conditions. Certain excess stores could have been left in Egypt with advantage. The value of the presence of senior administrators during the early phases of organisation of an expeditionary force was apparent. The advice of consultants would at times have been appreciated; in accordance with the original plan they would have come over later, but even in this brief campaign there were occasions when the advice of regional consultants would have been helpful. More than one experienced administrator in Greece commented on the age of soldiers in the swiftly moving campaigns of today. "Under forty" was the general verdict, and this same stricture may be applied to some extent even in the higher rankings. Though it is well known that anxiety and indecision are signs of fatigue and therefore often of age, the retarding influence of this hidden hand is often forgotten in the urgencies of modern warfare.

The organisation for moving the sick and wounded worked very well in spite of difficulties and some setbacks. At first trains were found useful for part of the journey on the right flank, and in the later stages trains again filled a very useful role. The modest dimensions of the Greek railway system, and defections from its staff, tended to obscure and lessen the

value of railroad transport of casualties. Considerable opposition was evident in Athens at one time during the events leading up to the final retreat, but hospital trains proved their value even under the unusual conditions. Ambulance vehicles of course carried the greater part of the burden, including the British light field ambulances, the Australian and New Zealand field ambulances, and notably the motor ambulance convoy.

Major Langford and Captain D. B. Wherrett of the 2/1st Motor Ambulance Convoy headquarters, Lieutenant M. R. Davies of "B" section and Lieutenant A. L. Proud of "C" section provided constant service through all difficulties. Till the 12th April they worked from Elasson; some of the distances covered were very great, such as the run of 130 miles from Edessa to the 2/3rd Casualty Clearing Station, which necessitated a car changing post near the light section of the 24th Casualty Clearing Station close to Servia. Car posts combined with shuttle services were found most valuable. The average "carry" was fifty miles, and the allotment of one relief driver for each five cars was found insufficient. When the force began to retire numbers of special reconnaissances of roads were made, and these proved invaluable. When the 24th British Casualty Clearing Station had to move at short notice the ambulance convoy cars moved both patients and staff. During the later retirement to Thermopylae long and frequent runs were made, as when railways were cut by aerial bombing and trains could not proceed. On one occasion through poor communications cars arrived to pick up patients who had already been moved by other vehicles, but the drivers always turned each trip to good account, and the cars never returned empty. During the early stages of operations in Greece it is evident that doubt existed as to whether the enemy would respect the red cross; experience showed later that the Germans respected it when units were clearly marked.

The problems of removal of nurses from threatened areas caused no little discussion and anxiety. Indeed, when the 2/5th Hospital left Alexandria some doubt was felt as to the advisability of the full unit proceeding, in view of the disturbing news from Greece. It was unfortunate that circumstances prevented earlier embarkation of the nurses from Greece, but the Australian policy was made clear as soon as the evacuation became inevitable. The nurses themselves accepted calmly the hardship and peril to which they were subjected.

Members of the medical services in Greece shared with others the frustrations of the campaign. Preparations carefully made for weeks beforehand suddenly became valueless, threats such as that of malaria ceased to be significant; but against these there was the privilege of helping a disciplined force of men who were confident even though exhausted. The medical officer of an infantry battalion remarked during the brief retirement that he had "never seen such a large number of people honestly trying to do something for someone else".

CHAPTER 13

CRETE

WHEN the British, Australian and New Zealand troops left Greece for Crete, General Wavell intended that they should be relieved and reorganised in Palestine and Egypt. This was not found possible because of the heavy burdens already borne by the Royal Navy, and the imminence of a German attack on Crete. The strategic importance of Crete was evident. Only seventy miles from Greece and close to the Dodecanese Islands held by Italy, Crete had a good natural harbour in Suda Bay, though with few facilities for handling ships and cargoes, and also small artificial harbours at Canea, and Heraklion. An airfield at Maleme, close to Suda Bay and landing grounds at Retimo and Heraklion, increased the value of the island as a base.

TERRAIN

Much of Crete is undeveloped. Some 170 miles long and 20 to 35 miles broad, the island is divided lengthwise by a mountain range which rises in places to 8,000 feet, and falls to the sea in steep cliffs on the southern side. On the northern side, where the harbours are situated, there is a narrow strip of more level country, with olive groves and some fruit trees and vines. The one reasonably good road runs along the coast from the airport at Maleme past the coastal harbours to Heraklion, but other roads are primitive and in most places tortuous and rough. The water supply derived from wells was sufficient, though the surface streams tended to dry as the weather became hotter.

Crete was known to be malarious in the season, but since February a British field hygiene section had been at work instituting malarial control, thus lessening the risk in the rapidly approaching summer. Very little malaria had been seen in the garrison force up to this time. This was fortunate, for the men entering Crete had no anti-malarial equipment. The weather was then fine and clear, with cold nights: it was evident that the long days of spring and early summer favoured an invader.

British forces were already in Crete, including three battalions. Something had been done towards organising defence by land, sea and air, but constant shortages of men and material in the Middle East and serious commitments in several theatres of war had not permitted much preparation. The 7th British General Hospital of 600 beds had been sent to Crete during the latter part of the campaign in Greece, and had been established for a week in a site some three miles west of Canea. The 189th British Field Ambulance had been there for some time, less one company which served in Greece.

ARRIVAL OF TROOPS FROM GREECE

The first phase of the military episode of Crete began when the ships of the Royal Navy arrived with the troops embarked from Greece. From

25th till 29th April ships kept arriving; some were repeatedly attacked by German aircraft during the brief passage but surprisingly little damage was done. The *Thurland Castle* carrying over eighty nurses and many wounded was subjected to air attack, but though leaking slightly, reached Crete without further incident. The S.S. *Pennland* was severely damaged by bombing and had to be abandoned. By coincidence a number of the officers of the 2/5th Australian General Hospital were on this ship, which had brought the members of this hospital to Greece only a few weeks before. Excepting for part of the 2/5th A.G.H. staff, left in Greece by deliberate policy in order to care for sick and wounded, most of the members of the Australian medical units reached Crete, either with the main convoys or in small craft which continued to reach Suda Bay till the early part of May. Most of the staffs of the 2/5th and 2/6th Australian Hospitals landed at Suda Bay on 25th April, and on arrival they were marched a short distance inland and bivouacked in pleasant country in the hills, with trees and cool mountain streams. The next day the 2/3rd Australian Casualty Clearing Station arrived and was accommodated near by. These units had carried out useful work during the trip to Crete. Even air attacks did not interfere with care of the wounded on board, and necessary procedures such as blood transfusion were carried out. The medical problems for immediate solution were the care of the 1,000 casualties which had arrived from Greece, the day by day attention of sick and the usual measures of hygiene. For the performance of these tasks the medical units attached to British, Australian and New Zealand forces landing in Crete had practically no equipment. As heavy equipment had been perforce jettisoned on leaving Greece, the only stores and instruments available, other than those already in Crete, were those carried out by hand. One difficulty arose in connection with the disposal of convalescents brought from Greece by medical units. Some were returned to their own units, but others were not fit for work and though not requiring treatment by the medical units had to remain with them as an appendage.

The Australian medical units then in Crete were the 2/5th General Hospital (Lieut-Colonel A. W. Morrow administering command), 2/6th General Hospital (Colonel R. A. Money), 2/3rd Casualty Clearing Station (Lieut-Colonel J. C. Belisario), 2/1st Field Ambulance (Lieut-Colonel R. H. Russell), 2/2nd Field Ambulance (Lieut-Colonel D. M. Salter), 2/7th Field Ambulance (Lieut-Colonel L. E. Le Souef), 2/1st Field Hygiene Section (Captain R. Drummond) and 2/1st Motor Ambulance Convoy (Major W. E. Langford).

As the sick and wounded arrived from Greece they were examined and sorted by officers of the 6th N.Z. Field Ambulance at a transit camp. According to their needs they were sent to the 7th British General Hospital or to medical inspection centres for attention, or returned to their units.

The three Australian field ambulances arrived at Suda Bay between the 26th and 28th April. Over 25,000 troops were then on the island; their medical supervision was obviously a considerable task for the restricted

service available, not because of lack of medical staff, but of stringency in stores. Fortunately both the 7th British General Hospital and the 189th Field Ambulance held supplies; the hospital was particularly well stocked and both units proved most helpful and cooperative.

The advent of the nurses from Greece was welcomed by the commander of the 7th British General Hospital, in whose area they were accommodated. He was anxious to retain the services of the New Zealand nurses, as his own nurses were still in Egypt. Accordingly the nursing staff of the New Zealand hospital was attached to the 7th British Hospital on the understanding that they would be returned to Egypt at the first opportunity. Matron E. C. MacKay of the 1st New Zealand General Hospital was placed in charge of the British, Australian, and New Zealand nurses who had arrived from Greece and acted as Matron of the 7th Hospital. Some of the Australian nurses also helped in the work of the wards, and members of the surgical staffs of the Australian hospitals undertook care of some surgical wards, which were soon overfilled by casualties from the recent campaign.

The transit camps held many sick and wounded temporarily, and such treatment as was possible was undertaken by the staffs of the field ambulances. In addition to the headquarters and "A" Company of the 189th Field Ambulance, there were two other British field ambulances, two New Zealand and three Australian, all fresh from Greece, but all without transport or equipment.

MEDICAL SERVICES IN CRETE

On 26th April Colonel W. W. S. Johnston, D.D.M.S. of I Australian Corps, and Colonel H. S. Kenrick, A.D.M.S., N.Z. Division, went to the recently organised headquarters of Crete Force and there made some interim arrangements for medical services. The New Zealand forces were assigned the defence of the Canea-Maleme sector where the New Zealand field ambulances were attached to their brigade groups. The Australian field ambulances were all in the same neighbourhood, in the Suda Bay area, and Lieut-Colonel Le Souef, commanding the 2/7th Ambulance, acted as senior medical officer. Most of these units were able to function to some extent, using supplies obtained from the 189th British Field Ambulance and the 7th British General Hospital.

The majority of the men arrived in Crete tired and hungry; in the Suda Bay area canteens arranged by the British garrison force were most welcome and useful. In the transit camps food was available, usually in adequate quantities in these early days, though cooking arrangements were often sketchy. Petrol tins were used for extemporised cooking utensils.

This phase ended with the close of April. The senior administrative officers of the I Australian Corps returned to Alexandria by flying boat on 28th April.

CONVOY LEAVES SUDA BAY

Early on the morning of 29th April a convoy of ships left Suda Bay. With this party were Brigadier Large, D.D.M.S. of the British Force in Greece, and Colonel Disher, A.D.M.S. of the 6th Australian Division. These ships also carried some of the troops who by reason of lack of arms and equipment would not be of assistance in the defence of Crete; all the nurses on the island were also embarked. In this convoy of ships was a small Greek ship, *Ionia* which carried about 200 nurses, some walking wounded and some troops. The crew were unwilling to face the risk of air raids, so volunteers from the troops took charge. During the night following embarkation there were some air attacks, but then the ship joined a naval escort and arrived safely at Alexandria. Another ship *Corinthia* carried many civilians, mostly women and children who were looked after during the voyage by members of the nursing staff of the 2/5th Australian General Hospital. This ship was attacked by planes and surface craft and the sight of the British naval ships was not only very welcome in the morning, but also assured a safe arrival in Egypt. The experience gained in embarking the nurses from Greece emphasised the need for prompt decisions concerning their transfer from dangerous forward areas.

PREPARATIONS FOR THREATENED GERMAN ATTACK

The second phase of the story of Crete began early in May and lasted some weeks. This was a period of respite and preparation. By this time most of the men who escaped from Greece had arrived in Crete, with the exception of a body of troops which arrived in Alexandria direct on 29th April. Among these latter were some 4,000 Australians, 80 of whom were sick or wounded. In addition, small groups of men appeared in Crete at intervals during the next few days, after more or less adventurous crossings in small ships. Even up to three weeks afterwards men were coming in, including some of the men of the 2/2nd Battalion, who, after being separated from the main body of the troops in Greece, had made their way to Volos on the coast. With one of the parties was a member of the 2/1st Australian Field Ambulance, who travelled in a small boat with others from the coast of Greece near Argos, navigating by a small map in a pocket diary. It is of course now known that escapes were made from both Greece and Crete by men who took many months to complete a hazardous adventure.

General Wavell visited Crete on 30th April and decided that the defence of Crete would be undertaken by the troops on the island. He appointed Major-General Freyberg as G.O.C. Crete, and Colonel Kenrick became D.D.M.S. of Crete Force, Lieut-Colonel W. H. B. Bull taking the position of A.D.M.S. of the New Zealand Division. There were some 35,000 troops on Crete, made up of British, Australians, New Zealanders and Greeks, with in addition some 4,000 unarmed Cypriots and Palestinians. General Freyberg addressed a number of the units in his official capacity on 2nd May, and pointed out the likelihood of a German attack by air

and sea. In view of the probability of an air invasion on a large scale, the various defence areas had to prepare for independent action in the event of their being isolated by parachute troops. The chief areas of British occupation of Crete were Canea and Suda Bay, Retimo and Heraklion, and in these areas four sectors of defence were organised as follows during the period of preparation.

The Heraklion sector was commanded by Brigadier B. H. Chappel, and was defended by British and Greek forces with the 2/4th Australian Infantry Battalion. A senior R.A.M.C. officer was in charge of local medical arrangements, and Captain P. A. Tomlinson was the R.M.O. of the 2/4th Infantry Battalion.

At Retimo was the headquarters of the 19th Infantry Brigade. Here Brigadier G. A. Vasey, the A.I.F. commander in Crete had a force including the 2/1st, 2/7th, 2/11th and about half the 2/8th Battalions with parts of other Australian units and improvised Greek battalions. Lieut-Colonel Le Souef, with one company of the 2/7th Field Ambulance was senior medical officer.

Major-General E. C. Weston, of the British force in Crete, commanded the Suda Bay area where there were a British group, the improvised 16th and 17th Australian Brigade Composite Battalions, the 2/2nd Field Regiment armed as infantry, elements of other units and two Greek battalions. The 2/1st Field Ambulance under Lieut-Colonel Russell was quartered in the area, and the 2/2nd Field Ambulance under Lieut-Colonel Salter was in the vicinity of Neo Khorion: both units were awaiting evacuation.

At Canea and Maleme, Brigadier Puttick of the New Zealand Division commanded the 4th and 5th N.Z. Infantry Brigades, the improvised 10th Infantry Brigade and Greek troops. For the purposes of medical administration the area was divided into a western sector from Canea to Maleme, where Lieut-Colonel Bull was in control, and the Suda Bay sector under Lieut-Colonel S. O. Dolan.

It was clear now that the Australian medical officers on Crete could only play a subsidiary part in the medical affairs of the island. There were still three large holding medical units of the A.I.F. in Crete, two hospitals and a casualty clearing station but they were impotent as they had no equipment. Only the Australian field ambulances were likely to play any significant part, and possibly not all of these.

In the further unfolding of this story only the experiences of these Australian medical units will be described. This account can only be supplementary to the British account and the stirring narration of the New Zealand Medical Corps which for the first time had complete control of its own forces. The Australian medical story of the defence of Crete therefore centres round the work of the three field ambulances and the unit medical officers in the Canea-Suda Bay-Neo Khorion area, around Retimo and Heraklion, and their part in the final events.

CONDITIONS IN CRETE

During the first week on Crete living conditions were primitive but in spite of shortages of clothing and blankets and exposure in the chilly nights under the open sky the men remained well. Respiratory infections were notably few. Many men complained of sore feet due largely to wear and tear on their boots on the stony outcrops. As some degree of stability was attained the men tried to improve their general conditions. Diarrhoeal disease was not uncommon, which was not surprising in view of the difficulties in establishing routine preventive measures. Water disinfection was unsatisfactory, and chlorination was limited in application; bulk treatment was impracticable as there were no water carts and individual equipment was scanty. There was a serious shortage of digging utensils, partly owing to faulty distribution which was possibly due in turn to the universal lack of vehicles. Such picks and shovels as could be obtained were needed for digging trenches for air defence, but in addition deep trench latrines had to be prepared. Dumps of tools were afterwards found, too late to be used for these purposes. Rations were rather below full normal issues, but at this stage were adequate, though cooking utensils were scarce. In addition eggs, nuts, oranges and bread could be obtained from the local inhabitants. The men also took the opportunity of sampling Cretan wines.

The paucity of transport caused serious difficulties to the whole force in Crete, and this intensified the scarcity of supplies of many sorts. It also restricted communication, which was poor throughout, in spite of the short distances. This was to be expected, for basic equipment was like other material on the island, meagre in amount. There were only eight ambulance cars on Crete when the troops arrived from Greece. Six of these were then allotted to the British field ambulance and two belonged to the Royal Air Force. Five others were brought in later by the navy, thus providing a total of eleven for army medical units. Medical supplies would have been almost non-existent in places had it not been for the stores held by the garrison force; otherwise the medical material brought into Crete comprised little more than what was carried in by the members of medical units. The ingenuity and nocturnal activities of an Australian provided the 189th Field Ambulance with some additional supplies obtained from the pharmacies in Canea.

THE MEDICAL PLAN

The medical plan as made early in May provided for hospital service from the 7th General Hospital and an extemporised hospital run by the 189th Field Ambulance which was stationed a little outside Canea, with a post on the road running north of Suda Bay. A naval hospital near Suda Bay treated many patients from the neighbourhood. The 7th Hospital and 189th Field Ambulance were within the New Zealand sector, where the New Zealand 5th and 6th Ambulances were attached to the N.Z. brigade groups. The 6th N.Z. Field Ambulance was also used by the 7th Hospital as a convalescent depot. Special aid posts served the



Awaiting evacuation from Greece at Megara.

(J. C. Belisario)



Transporting supplies on Crete.

(J. C. Belisario)



Suda Bay, Crete, target for German bombers.

(S. B. Cann)



Troops leaving Suda Bay, Crete.

(W. E. E. Langford)

airfield at Maleme and the harbour area, and there was a reception hospital at Heraklion. The dressing stations in these and other field units were often extemporised from slender resources.

As the month of May passed the weather which had hitherto been fine became colder with intermittent showers of rain. There was little cover for the troops, and considerable ingenuity was practised in sheltering the sick. The position was helped by the appearance of the hospital ship *Aba* on 5th May, which with considerable expenditure of time and effort contrived to pick up 600 patients in small boats. These men were safely returned to Alexandria.

During this phase of the events in Crete enemy aircraft continued to attack shipping approaching or leaving Crete and at anchor in Suda Bay or in the vicinity. Daylight movement of ships became too dangerous, and the clear moonlit nights made attacks possible by night as well as by day. Some supplies continued to arrive from Egypt by sea, but losses were inevitable. One severe blow was the sinking of the *Rawnsley*, with a large quantity of stores on board including 25 tons of medical material.

THE AUSTRALIAN FIELD AMBULANCES

It is simplest to follow the activities of each ambulance in turn during the first few weeks of May. All three units were at first collected in a fairly circumscribed area a little inland from Suda Bay.

Russell's unit, the 2/1st Field Ambulance, had taken over a camp reception station at Kalives overlooking Suda Bay, and was looking after patients there. The members of the unit were camped in an olive grove behind the village on the shore of the bay. Discipline was maintained unrelaxed throughout this period of suspense, and the men were kept occupied when not working by outdoor exercise, marching and swimming. Their spirit was good. On 3rd May, the commanders of the 2/1st and 2/2nd Field Ambulances were warned to keep their units on two hours' notice of movement. On 9th May some forty ships assembled in Suda Harbour. At dusk they sailed for Egypt taking troops who could no longer be used in the defence of Crete, but no instructions for embarkation were given to the two field ambulances.

Communications were unsatisfactory at this time, and there was occasional confusion as to who should give orders. Russell, on 14th May, received within twenty-four hours three different sets of instructions about the work of his unit. Salter about this time was told by Brigadier Vasey not to take orders from anyone outside the 19th Australian Brigade Group. The 2/1st Field Ambulance was now withdrawn from medical activities and prepared to move closer to Suda so as to be ready for departure at short notice. The proposed bivouac site overlooking Suda Bay was wanted by the artillery, so, keeping a detachment in case of emergencies at the aid post on the harbour wharf, the ambulance remained on the shore, housed in caves. There was here at least some simulation of stable conditions; pay was available, tinned fruit was issued, and copies of a paper *The*

Greek News published locally in English could be obtained. Nothing more was heard about embarkation.

The 2/2nd Field Ambulance camped at Neo Khorion and after a fortnight's inactivity began active work on 14th May, and ran a camp reception station near the headquarters of the 19th Australian Brigade. Full cooperation was given by the 7th British Hospital and the 189th Field Ambulance in supplying medical stores; indeed this readiness to help and share was a feature throughout. Even the stores held by these units could not last long in the face of constant demand. Bandages had been made from flannelette commandeered locally, and even sheets were torn up for dressings. By 19th May medical supplies failed, and work was reduced to a minimum. Captain K. J. Dorney, of the 2/2nd Field Ambulance, was in charge of a convalescent depot one mile west of Suda Bay for a few days, from the 17th May.

Meanwhile, Le Souef had the men of the 2/7th Field Ambulance camped at Neo Khorion, after overcoming the initial problems of scarcity of cooking gear, fuel, digging utensils and blankets. Here they opened a small aid post, and then took over a reception station from the 189th British Field Ambulance in a school house. The hygiene of this was defective, but at least it gave cover to the patients. The members of the unit preferred dispersal under the olive trees to the doubtful advantages of the building. Medical supplies were of course scanty; minor operations were performed with razor blades, and little active treatment was possible. Quite early, on 5th May, the sphere of activities was extended to Georgioupolis on the coast, where another dressing station and a convalescent camp were opened by "A" Company in charge of Major F. K. Wallace.

On 11th May, another dressing station was established by Major J. D. Palandri at Adhele, near Retimo. The medical post here was not marked with a red cross: some bombs fell close by on one occasion but failed to explode. In view of the probability of an attack at Retimo Captain F. E. Gallash and the remainder of "B" Company reinforced this post with extra stretcher bearers and orderlies, and a few drugs and dressings. "B" Company was likely to be called upon to carry out the heaviest share of the medical work devolving upon the 2/7th Field Ambulance, and, further, would be isolated in the event of an attack on Retimo. Consequently the stocks of the unit were depleted to about one-quarter to supply this company; in view of the need for shelter these supplies included the unit's only remaining tent flies. Some red and white cloth was obtained from which brassards were made. Le Souef eked out the slender medical supplies by buying aspirin and boracic acid at a pharmacy in Canea where there were still some supplies for sale. The main body of the unit then moved four miles closer to Suda into an area for unarmed forces, leaving a medical officer and a few men to deal with any patients. The main dressing station at Neo Khorion was closed and re-opened at Vrises, somewhat nearer to the posts of Retimo and Georgioupolis, but the new site was exchanged after a few days for one less exposed. Disposal of

patients was difficult owing to lack of vehicles of any kind. The only practical method of transfer to the British hospital was to keep picquets on the road who stopped passing vehicles; the frequent air attacks in the vicinity added to the difficulties, though fortunately many of the bombs did not explode. A detachment under Captain B. Gillett was able to attend many sick and wounded on the road near Stilos. Just before the German attack Brigadier Vasey asked the cooperation of the medical services in disposing of those men who might in the opinion of the commanding officer affect adversely the morale of others in the face of attack. About 6 per cent of the men evacuated to safer areas at this time came within this category.

REARRANGEMENT OF MEDICAL PLANS

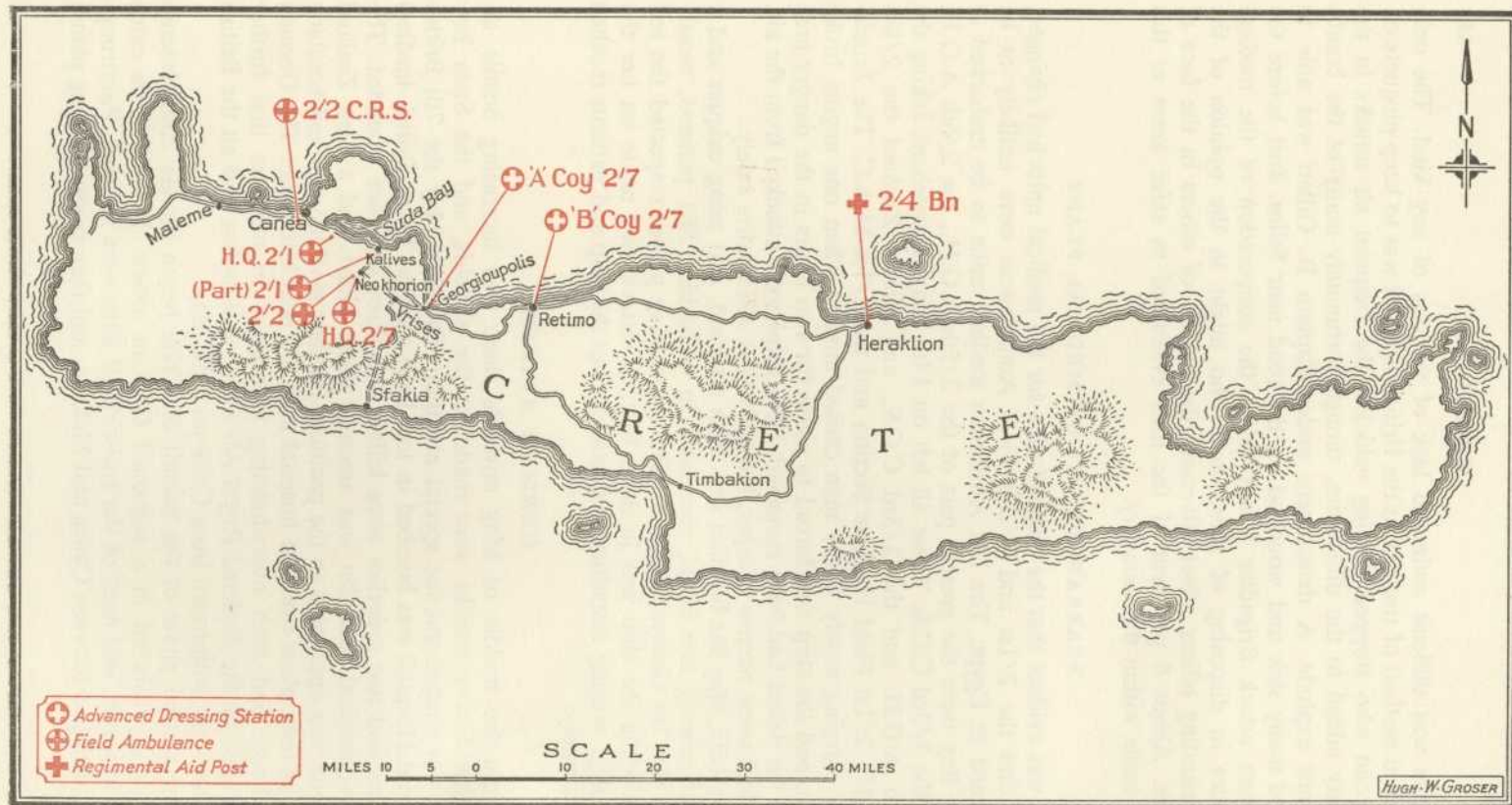
It was evident that the original plan for the medical units had changed, and that the 2/1st and 2/2nd Field Ambulances were unlikely to be returned to Egypt. The last Australian medical units to be embarked at Suda Bay were the greater part of the 2/5th A.G.H., the 2/6th A.G.H. and the 2/3rd C.C.S. These all left on 14th May; *Lossiebank* taking the 2/5th A.G.H. and the 2/3rd C.C.S., and *Nieuw Zeeland* the 2/6th A.G.H., 2/1st Field Hygiene Section and the 2/1st M.A.C. The *Lossiebank* carrying nearly 2,000 men caused anxiety when one engine broke down, and the ship was forced to circle for two hours in the danger area until the defect had been remedied. Both ships were attacked from the air, and had some narrow escapes, but arrived at Alexandria safely.

On 16th May the hospital ship *Aba* returned, and using caiques and a launch towing two boats, succeeded in embarking 561 patients, mostly from the 7th General Hospital. Though raiding planes respected the red cross while the ship was in Suda Bay, an attack was made on her the next day, causing casualties and damage, but the ship and patients reached Haifa safely.

GERMAN ATTACK

From the middle of May onwards there was increasing hostile air activity. Heavy attacks were made on the airfields, and the Suda Bay area was singled out for special attention. On 18th May the 7th British General Hospital was bombed in low level attacks. Three British medical officers and two orderlies were killed, and three orderlies wounded. The British surgical specialist was amongst those killed, and a New Zealand surgeon was appointed to the position. Further machine-gun and bombing attacks took place over the hospital area the next afternoon. The German Air Force had such overwhelming superiority in numbers that further resistance by the depleted Royal Air Force was useless and all the British aircraft were withdrawn from Crete on 19th May.

The second phase of the assault on Crete began on the 20th. Intense air activity ushered in a sustained German attack. Dive-bombers came over in waves, and most of the anti-aircraft guns were silenced. Paratroops were dropped between Canea and Maleme, and then troop-carrying planes



Crete, 18th May 1941.

and gliders came in. Retimo and Heraklion were also heavily attacked. Determined efforts were made to counter these attacks, and extremely heavy losses were inflicted on the Germans. All possible non-medical forces were armed to cope with unaccounted parachutists, and all the medical units prepared to deal with the expected casualties. During the next two days fierce fighting raged as thousands of German parachutists landed in the strategic centres of the northern part of Crete, and hundreds of troop-carrying planes brought in reinforcements. The Germans suffered colossal casualties, but nevertheless could not be permanently dislodged from the Maleme-Suda Bay area despite destructive counter-attacks by the New Zealanders. They also succeeded in cutting communications between Retimo and Suda Bay, thus isolating the forces at Retimo, from which the 19th Australian Brigade had moved its headquarters to Suda Bay. All attempts failed to dislodge the enemy from the road into Retimo.

In the hospital area incredible and tragic events happened. The 6th New Zealand Field Ambulance was captured and the next day released: its commanding officer, Lieut-Colonel Plimmer, was shot by a parachutist though he had surrendered. The 7th British General Hospital was also attacked and captured, after some damage to the wards and loss of life of patients. Losses of staff and patients would have been greater only for the excavation of some wards below ground level. Adequate protective markings were displayed; red crosses were painted on the three roofs before the attack, and crosses were laid out on the ground. It appeared that the Germans would not recognise as non-combatants any persons wearing steel helmets, and regarded them as not being protected by the red cross, though this view is not based on the Geneva Convention. Care was taken later to avoid any such possible resemblance to combatant troops. It may be that enemy Intelligence did not reveal the true nature of the hospital area, but since a captured air corps report shows that hospital "barracks" and "huts" were seen on 18th May it is hard to justify an attack on 20th May. The hospital was freed, and the next day recaptured, when the staff immediately re-established wards in large caves on the shore. These happenings are described in the New Zealand Medical History.

Meanwhile all efforts had been made to land reinforcements on Crete. The enemy's air superiority made this most hazardous. All the naval operations around Crete were carried out at high cost in loss of ships and men. Notwithstanding these difficulties some reinforcements were successfully landed, part joining the forces at Heraklion and part those at Suda Bay. On the night of 21st and 22nd May enemy troops attempted to land on Crete from the sea, but their small craft were intercepted by ships of the Royal Navy under Rear Admiral Glennie twenty miles north of Suda, and the whole force dispersed. The firing of coastal defence guns and flashes and noise of guns at sea were seen and heard by the troops in the Suda area who realised their significance, and were greatly heartened. The action was costly, nevertheless, and the fleet by remaining on watch in the danger zone in daylight hours suffered heavily from attacks from the air.

By the 23rd the position in the chief defence areas was serious. The Germans had poured in air-borne troops in thousands, though estimates of the numbers landed on the previous day have been exaggerated. The Maleme airfield, after fluctuations of combat, had passed to the German forces which had joined with other forces near Galatas, the site of one of the camps originally prepared for New Zealand troops. At length the defenders were forced to withdraw to an area west of Canea. The 189th British Field Ambulance was holding hundreds of wounded men in an extemporised hospital. Unfortunately in the bombing of the British hospital area tents containing precious medical stores were destroyed, a loss which was felt heavily in all sections of the Suda Bay-Canea sector. The New Zealand field ambulances were also caring for large numbers under great difficulties. A little south of Canea the 1st Marine Tented Hospital, which had only been a fortnight on the island, was helping to take the overflow of the 7th General Hospital. No more respite could be expected and the field ambulances worked hard at moving their patients on as a further German attack was expected. This attack matured on the afternoon of 25th May, when an intense land and air bombardment of the Galatas sector initiated fierce fighting. In spite of successful counter-attacks by the New Zealanders the Germans increased the pressure of their growing forces, and by infiltrating behind the front at Canea, forced a withdrawal. The medical services worked continuously during the battle, but Lieut-Colonel Bull, A.D.M.S. of the N.Z. Division instructed both the field ambulances and the British hospital to withdraw some seven miles to Neo Khorion. After delays and many difficulties these units reached Neo Khorion with their patients on the 26th, and there carried on with their work. The staff of the 7th Hospital were compelled to leave 300 patients in the caves, in the care of two R.A.M.C. officers and orderlies. An effort was made to remove them but this failed. This unit had done fine work holding some 500 patients in caves since the German air invasion, cooking on primus stoves, carrying all water, and doing surgical work on an operating table in the largest cave.

WORK OF THE FIELD AMBULANCES

Owing to the isolation of the different components of the defending forces, lack of communication and of medical supplies the Australian field ambulances were only able to make a limited contribution to the medical needs of the troops in the Suda-Maleme area. The nature of the attack made conditions doubly difficult. Paratroops had been reported as landing in many places over the preceding days; in some instances investigation revealed no troops, but splints and other medical supplies were found. Elastic bandages recovered from the ankles of dead paratroops were used in the dressing stations.

Russell's ambulance was still in reserve, the men being quartered in caves. Salter's unit the day after the invasion began had moved to an olive grove near a road junction with the coast road, where a dressing station on a modest scale was set up. Sick and wounded were held here

in a ruined house, there were few facilities for treating them and little chance of sending them on. The only equipment consisted of a few stretchers, some medical haversacks and a few dressings. There were doubts about the purity of the water supply; this came from a village well and was suspected of being contaminated. No sterilising powder was available and shortage of fuel made boiling the water impossible. Dysentery was occurring in a considerable number of troops, but fortunately it was mild, and subsided in a few days. Le Souef acted as liaison officer with the brigade headquarters when the action began. "A" Company of the ambulance was ordered back towards Canea, and the trend of events in the next day or two showed that the brigade headquarters would probably be moving towards Suda. The possibility of the isolation of "B" Company at Retimo was apparent early; Le Souef in visiting this company had to leave the town promptly to escape being cut off by paratroops. On 23rd May some British engineers called at the dressing station to enquire the way to Sfakia: this was taken as an indication that a retirement was being contemplated. Next day Le Souef with some men from his "A" Company and some from the 7th General Hospital, went across country to his headquarters site. Here a brigade vehicle was obtained and by midnight sixty patients and the staff of the dressing station had been moved to large caves in the side of a hill, not far from where "A" Company was now established, well concealed in an olive grove. The protection of slit trenches was necessary, for enemy aircraft were busily attacking the roads. In the caves many local inhabitants were sheltering. These Cretans had been from the first most friendly disposed towards the defenders, and gave them milk, eggs and cooked potatoes, which were a welcome supplement to the reduced rations obtained from a depot on the Suda road. Patients were still arriving, and stretcher squads were sent to the 2/7th and 2/8th Battalions to collect wounded. Captain R. R. Anderson, R.M.O. 2/8th Battalion, had improvised stretchers from small pine trees and blankets but found they were too heavy for use. It was now imperative to hold these men, of whom about fifty had collected in the dressing station, for enemy parties were too close to Canea for patients to be sent to the hospital. Only one small body of wounded was transferred to hospital in this period.

As previously described, the New Zealand field ambulances arrived with patients at Neo Khorion on the night of 26th/27th May. This centre was no longer on the outskirts of either military or medical activity, for the front line, or rather the irregular edge of the enemy advance was flowing swiftly on. On 26th May, General Freyberg signalled to the Middle East that evacuation of Crete was inevitable. "In my opinion the limit of endurance has been reached by troops under my command here at Suda Bay."

Though the brunt of the attacks had fallen on the Suda Bay and Maleme sectors sustained assaults were also made on Retimo and Heraklion. These areas were cut off from the other defence areas and communication was almost impossible. Conditions reverted to the most primitive types of

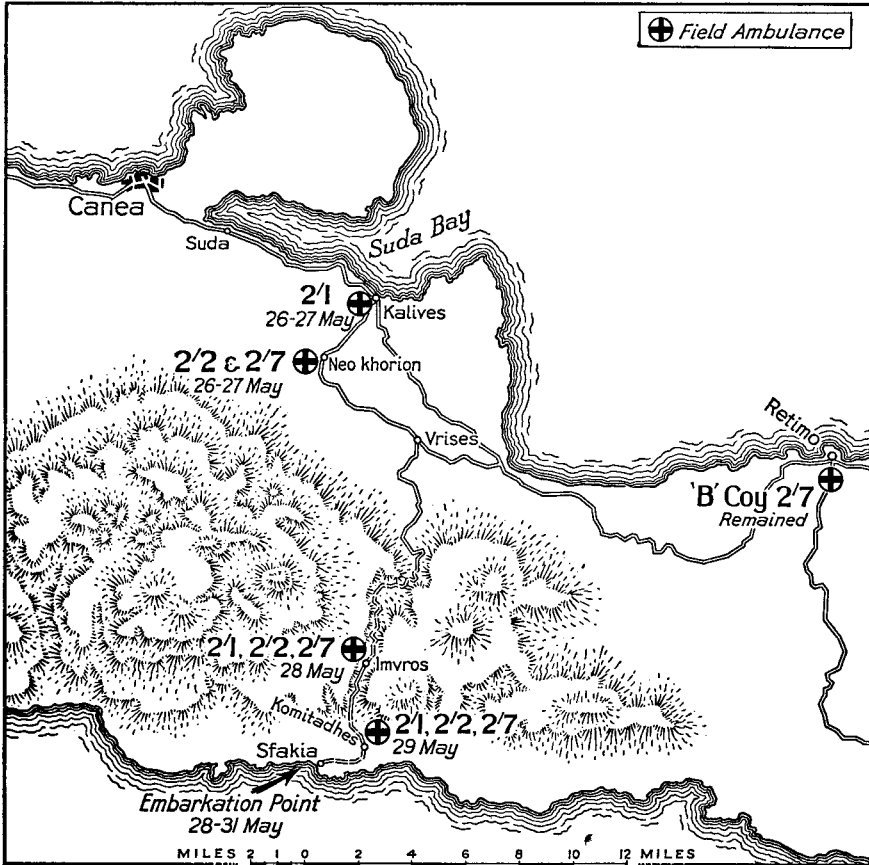
warfare, with the defenders seeking to destroy invaders by groups or by individuals, and themselves acting in small groups. There was no front in the military sense, and it seems incredible that while parachutes dropped men, ammunition, food and medical supplies, runners were attempting to carry messages on foot through positions held by enemy groups. No contact had been made with "B" Company of the 2/7th Field Ambulance at Retimo; only long afterwards was it known what happened to the defenders of this area. The pressing needs of the Suda area had called the greater part of the 19th Australian Brigade away from participation in the action at Retimo, and under Lieut-Colonel I. Campbell the forces remaining there kept up a gallant defence. The further story of the medical detachment will be told later.

The arrival of large numbers of wounded from the overwhelmed western areas brought to the 2/1st Australian Field Ambulance a short period of intense activity. To relieve the untenable position of the British 189th Field Ambulance extra billets were secured in a school and other building at Kalives, and during the night of 26th/27th 150 patients arrived. Many of these men were exhausted; the ambulances landed by the Royal Marines were most useful, and extra stretcher parties were organised. By seven the next morning about 600 patients were under treatment. A Greek nurse arrived who had been working in the British hospital and was most helpful. Red crosses were marked out on the roofs of the buildings often made from red carpets and other materials from villages, and were in the main respected. One low level attack was made by an enemy plane with one casualty, a patient who was killed in bed by a bullet coming through the window. Russell asked Crete Force for a surgical team, but the request was refused, and the unit was warned that no security of tenure there could be expected. The steady flow of casualties continued from British and New Zealand forces and the Royal Navy, and were disposed of and treated as well as circumstances permitted. A large overflow had to be dispersed under the trees.

WITHDRAWAL TO SFAKIA

General withdrawal was now taking place from Suda Bay and Canea. This was part of the withdrawal of all forces from Crete, for which plans were made. A sea movement was planned from Heraklion, in which it was hoped that the forces in Retimo would be included. The remainder of the troops could only be taken off from beaches on the southern side of the island, where there were no harbours. The only practicable route was over the central hilly spine of Crete to Sfakia. Here there was a suitable area for embarkation by boats, though the road, which was rough and stony after winding through hilly country, degenerated to a mere track and ended at a steep escarpment traversed by a steep rocky path aptly described as a goat track. The distance was about thirty-four miles. The 19th Australian Brigade and New Zealand units had the task of fighting a rearguard action, and began by withdrawing to Neo Khorion. The plan provided for control from Suda area of the movement to Sfakia, setting

up a staging camp halfway, and policing the route and preventing stragglers from holding up progress. The New Zealand Divisional Command later attempted organised control, but no real degree of military precision was realised. The withdrawal of 3,486 troops from Heraklion was successfully carried out on the night of 28th May, but the close encirclement of Retimo by the enemy prevented more than small groups of men from escaping over the hilly country to the south coast.



Withdrawal from Crete, 26th-31st May 1941.

Heraklion at the time of the withdrawal was threatened from the hygienic aspect as well as the military. The troops quietly abandoning their posts for the perilous sea evacuation left behind them a town in ruins. Captain Tomlinson, R.M.O. of the 2/4th Battalion, pointed out the danger of an outbreak of infectious disease from the broken sewers choked with filth and from decomposing bodies.

On 28th May, the rough road across the island to Sfakia was full of troops. Some vehicular movement was possible, but facilities for move-

ment of patients were very limited. It was inevitable that some patients must be left behind. The red cross on the vehicles used for the sick was respected by German airmen. As it was necessary for most of the men to walk all the way, the criterion of selection of patients able to join the march to the embarkation point was their ability to make their own way. Hence an order was promulgated by the British Headquarters in Crete that "no walking wounded will be permitted to start who have not a fair chance to finish the route". The staff of the 2/1st Australian Field Ambulance divided their patients into those who were able to march four miles and those who were not. There was no time to organise rations satisfactorily. Food dumps were prepared to supply men moving to Sfakia, but in the darkness and confusion these were not always used. A general basis of three days' rations carried by fit men was adopted, but shortages such as biscuits and bread reduced the value of these. Previous enemy action had destroyed a flour mill and sunk a ship carrying flour, so bread was scarce. The commander of the 2/1st Field Ambulance now had to dispose of his 600 casualties held in the improvised billets at Kalives. At five o'clock in the afternoon of 27th May there were 230 men who were able to walk, and 375 unable. He conferred with Lieut-Colonels Bull and Le Souef and decided that more than one medical officer would be needed to look after men who must be left. A warning had previously come from Crete Force that one medical officer and some orderlies would probably have to stay. Playoust of the 2/1st Field Ambulance was selected from volunteers to remain, and the commanding officer decided to stay with him. Every man in the unit would have been agreeable to remain, but Russell was ordered to accompany the unit when it moved off from Kalives before midnight. Casualties were still arriving.

The rear party of the 2/1st Field Ambulance followed on at 2 a.m. on the 28th, but was lost in the hills; villagers in a little settlement gave them food, water and wine, and at daylight sent a guide with them. There were sounds of firing close by, but after a day's travel across country they caught up with the main party at dusk. The whole body moved on to Imvros, and under orders stayed there till dusk the next day. Despite instructions that movement was to take place only at night, the roads were crammed with men by day. Most of these were not soldiers but civilian Greeks and Cypriots. Water was obtainable but no rations. Meanwhile the 2/2nd Field Ambulance had moved back to its old site at Neo Khorion, even managing to get road transport for some of the wounded. On the 28th they left by night and marching through the hours of darkness stopped at Imvros with other troops. The two New Zealand ambulances also reached Imvros in a party including the 7th British General Hospital, all under the command of Lieut-Colonel Twigg the commanding officer of the 5th N.Z. Ambulance. Two trucks carrying sixty patients also arrived at Imvros, but most of the staffs and patients from medical units had to walk in straggling groups, except they could get a lift in the few passing trucks. The walking wounded collection post had been arranged at Kalives, and some rations and a pannier were left there

by the 5th N.Z. Ambulance. The position was rapidly becoming more involved; the 19th Australian and 5th New Zealand Brigades fighting as a rearguard had successfully withdrawn, but there was little time left. Wounded were brought on in vehicles whenever this was possible, but the condition of many of the vehicles was poor, some had to be thrust off the road to prevent congestion. Among the thronging marchers along the road were men whose wounds might well have prevented them from travelling, but they showed the utmost fortitude. The 2/7th Field Ambulance continued to receive patients at its dressing station till the evening of 27th May. The commanding officer was not definitely informed of the movement to Sfakia till some officers of the Royal Marines arrived with wounded and told him that the retreat was in progress. Carrying some patients on blankets the headquarters and "A" Company started back towards Neo Khorion, and after commandeering a truck for the wounded marched past the village and then dispersed. A small dressing station was established at Neo Khorion by Bull as there were wounded patients to care for, and he and Captain King remained there, later being taken prisoner. "B" Company was of course still inaccessible. In small groups the unit moved on by night, lying in concealment by day.

During the 28th May the commander of 5th New Zealand Field Ambulance and officers from the 189th British Field Ambulance noticed that considerable movement of troops was taking place on the road during daylight, and taking advantage of this, they managed to have trucks filled with wounded. Red cross flags made from red and white blankets were displayed on the trucks which safely reached the headquarters of the 2nd New Zealand Division without interference. While the 2/2nd Field Ambulance was at Imvros Lieut-Colonel Salter was informed by a German prisoner that German pilots were instructed to respect medical establishments, but only if no concealment or camouflage was attempted, if hospital areas were marked out with red crosses, as well as displaying the flags, if no steel helmets were worn, and if the men kept still or moved quietly about their work when planes flew over.

The three Australian field ambulances after passing on from Imvros were more or less reunited on the 29th, and proceeded to Komitadhes where the road ended at the steep escarpment above the beach. Part of the 2/1st Field Ambulance was lost for a time, but eventually all the men were collected. Many of them were very tired and hungry, and as diarrhoea was affecting a considerable number of the troops their general condition was not good. Food was scarce, though search of abandoned vehicles often revealed unexpected supplies. Water was available, though scarce in places, and it was fortunate that the inevitable queues at water points were not attacked from the air. Medical care was organised at some points along the road to Sfakia. The 2/2nd Field Ambulance established a dressing station in a church. A hospital was also improvised at Nebros, and at this a number of medical officers collected. A medical officer and some orderlies were needed to stay to look after fifty wounded men. By drawing lots between the single men Captain Dorney of the 2/2nd Field

Ambulance was selected, and Privates Pinkerton and Robinson from the same unit; they were promoted to lance corporal. Seven days' rations were left with this party.

EMBARKATION

Embarkation began on the night of 28th/29th May and continued on the next night. There were many difficulties in this manoeuvre. No signal communication existed between the top of the 500 foot escarpment and the beach, and messages had to be taken on foot. It was a laborious climb up the rocky track from the shingle beach to the top. The descent to the beach was firmly controlled; no time could be allowed for over-cautious negotiation of the steep and rocky trail, though many of the men needed assistance. Previous arrangements had been made for priority of embarkation but men were sometimes astray from their units and valuable time was lost in assembling and checking them. In a desire to prevent congestion and confusion, officers controlling movement kept the men from the immediate vicinity of the top of the cliff, but this tended to defeat its own end as the rate of movement slackened unduly, slowing the loading of the boats. The ships' officers could have handled more men in a given time. Destroyers were used for the embarkation; escorting cruisers anchored off Sfakia while the destroyers patrolled seaward with anti-aircraft cruisers, each destroyer coming in between the cruisers in turn to receive men from the beach. Landing craft were used to transport the men to the waiting ships. The size of the beach in itself limited the rate of embarkation. Sfakia is only a little fishing village, and the beach is only 150 yards long and barely 20 yards wide, too small to permit the use of ships' boats in addition to other craft.

After the first night the men had to find places for rest and protection, especially the sick and wounded, all of whom had not been taken off. The remaining wounded and others who had priority for embarkation were taken as close as possible to the beach beforehand; some found shelter in caves and under improvised cover. Time was sometimes lost during the nights of the 29th/30th and 30th/31st May collecting the men from shelters. Air attacks were frequent during the day; many of the patients showed signs of fear and anxiety, needing not only such minimum comforts as food and water but the help of reassurance. Not only the sick and wounded suffered severe trials of body, mind and spirit. Even the fit men felt keenly the toil of their weary journey, menaced by attacks from the air, which increased the number of wounded, and even added to the injuries of men wounded already. Over them brooded the uncertainty and frustration of an embarkation which for many of them would never be realised; only in utter weariness could they lose themselves in sleep. A number of collection posts for walking wounded were set up at points near the end of the road; these were cleared as word was passed back from the embarkation point. Occasionally men tried to press past wounded during the slow descent to the beach, but little trouble was experienced. There was no lack of assistance during the ordeal of the final clamber

down the rocky face to the beach, and a donkey was used for the wounded on the last stretch of their nightmare journey.

Some doubt arose as to how many men would be embarked after the second night. The men awaiting movement felt that more could have been taken. The embarkation officer allotted one medical officer and five medical orderlies to each fifty patients. On the first night about 700 troops were embarked, including 200 wounded. Unfortunately a large scale air attack caused loss of a destroyer, and damage to two cruisers returning from Heraklion, thus embarrassing movements from Sfakia on succeeding nights. On the second night 6,000 men were taken, though it had been hoped to take 9,000. Efforts were made by General Freyberg to get more ships for the evacuation on what he realised would probably be the last night. Four destroyers left Alexandria to carry out this manoeuvre, but enemy action and mechanical defects compelled the return of two ships, and the remaining two embarked 1,500 men. It was then thought that 6,500 men were left on Crete, including more than 1,250 Australians.

It was confidently expected by the remaining forces on Crete that embarkation would continue for another two nights and the staffs of medical units made their plans accordingly to gather all the sick and wounded. The enemy had made contact with the retreating force, but the rearguard action under Major-General Weston was continued with success and little further interference from land forces was experienced. Though the number of men lifted on the night of 30th/31st May had been disappointing, the landing craft left on the previous night were still available at the beach and by having these loaded when the ships arrived on the night of 31st May/1st June a precious half hour of time was saved. The men were embarked with such expedition that the beach was promptly emptied, but an unfortunate delay resulted while more men were hurried down the last stretch of the road above and the final declivity. This last minute rush of troops was a misfortune, as many of them were perforce left behind though approximately 4,000 actually sailed with the ships. The general opinion was that too great a restriction had been placed on movement at the beach head, and on the approach to the descent. Filling the beaches might have increased the risk of attack, but ample cover was available within a few hundred yards, where men left over from an embarkation might have retired for shelter in the early morning hours. Food and water were both serious problems; although incoming ships had brought rations there were still men who had had no food for several days. Some food had been dropped by aircraft at Plaka Bay, and General Blamey on the last night asked that a ship be sent there. However, it was doubtful if troops had received any message advising the use of this beach, and it was too late for arrangements to be made. Among the last 4,000 men embarked were as many medical personnel as possible, excepting those needed to care for the men too ill or helpless to be moved. Le Souef on the afternoon of 31st May found some more wounded men and obtained stretcher bearers to move them. As an additional medical officer was required to care for the remaining men Captain Gunther of the 2/1st Field

Ambulance was chosen to remain. In arriving at a decision as to who should stay and who should be in line for departure the three Australian ambulance commanders consulted together and selected men as fairly as possible on the basis of the value of each individual for particular duties. The final list drawn up was made on the assumption that still another night would be available. This opportunity never came and Le Souef and other members of the Australian ambulances remained and were taken prisoner.

A few parties managed to escape in various kinds of craft; one contrived to reach the African coast in a landing barge after suffering great hardship and some loss of life. Others hid in the hills where they were befriended by Cretans. It is interesting that Homer speaks of a tribe known in those days as "true Cretans", who even up to the present claim that in their refuges in the "white mountains of the west now called Sfakia" they have never been conquered by invaders.¹ The majority of the British, Australian and New Zealand troops then remaining were, however, taken prisoner. It was evident that capitulation was the only course. The senior officer in charge of the remainder of the force was empowered to capitulate, as definite information had been sent to Weston personally from Wavell that no further embarkation was possible. Not only were there sick and wounded left who needed medical care, but illness was increasing, chiefly due to diarrhoeal infection, probably carried by unsterilised drinking water.

Fortunately the return of the sick and wounded to Egypt was in the main accomplished once they were placed on the destroyers, but enemy action from the air often subjected them to dangerous and trying experiences. The most unfortunate happening was the attack on H.M.S. *Orion* on the night of 28th/29th May from Heraklion. Bombing attacks wrecked the bridge, put the ship temporarily out of control, and caused heavy casualties among the troops on the mess decks. Many men were killed, and many others suffered severe burns, fractures and other injuries, due to blast, and were admitted to the 2/11th Australian Hospital at Alexandria.

FURTHER EVENTS IN CRETE

That part of the defending force which was left on the island capitulated to the Germans. A little church about a mile from the beach was used as a treatment centre at first after capitulation, but the Germans, no doubt wisely, ordered evacuation of the patients to more settled areas. This imposed a test of fortitude on the patients and endurance on the stretcher bearers, as the ground was exceedingly rough and stony. An air attack on the beach immediately after the negotiation of surrender, but before the air force could be acquainted of the situation, caused more casualties and considerable distress.

The experiences of "B" Company of the 2/7th Australian Field Ambulance at Retimo were unusual. After setting up an M.D.S. and an

¹ *Homer*, by W. H. D. Rouse, Thos. Nelson & Sons Ltd. 1939.

A.D.S. Major Palandri tried to secure some additional supplies from Greek stores in Canea, but was unable to obtain any. The Greek medical officers agreed to look after their own wounded. When the German attack opened on 20th May the company was isolated from its parent unit, and concern was felt for the safety of the unit commander, who left just before the heavy air assault began. From the beginning of the action it was thought wise no longer to trust to concealment and dispersal, and conspicuous red cross emblems were again used, made from red and white parachutes captured from the Germans and draped over olive trees under which, sheltered by their tent flies, the unit was working. These were respected by the German air force. After 21st May the isolated company was kept very busy with casualties. On this day an armed German group appeared, but beyond a rigid inspection did not interfere with the work. Australian, German and Greek military casualties were now coming in, and some Cretan civilians. Palandri tried to arrange for evacuation of some casualties from Suda Bay to Alexandria, but without success. In the fluctuating fighting around Retimo the Australians took a German paratroop medical aid post. On 23rd May Captain A. G. G. Carter, the medical officer of the 2/1st Australian Battalion removed wounded from the aid post in no man's land to the Australian dressing station. Here Australian and German medical officers and orderlies, worked side by side. A three hours' truce was arranged for the collection of wounded. Major Palandri and Captains Gallash and M. Mayrhofer of the Australian ambulance continued working with two German medical officers and their orderlies and several Greek medical officers with Greek medical students. They used the same operating theatre until the 24th May when the Germans were allotted to their own operating tent. There were then 147 Australian patients in the dressing station, with 252 Germans and 51 Greeks. The scarcity of medical supplies was relieved by Captains Carter and J. J. Ryan of the Australian 2/1st and 2/11th Battalions, who daily sent in captured medical stores. Some German supplies were dropped from the air, and some items were damaged. On 26th May the Germans allowed Ryan to collect wounded under the protection of the red cross, and ceased fire while this was done. He also arranged with a German officer for safe passage of British and German wounded to Georgioupolis, but a German non-commissioned officer turned back the truck. After 28th May no communication was possible with Suda or Canea. The Germans occupied the Australian post on 30th May, and sent casualties by air to Athens. One curious feature of the action in Crete was that patients were transported by air in German planes from Crete to Greece while the withdrawal was taking place and before the remaining forces capitulated.

After the force at Retimo had been captured Carter with some of the ambulance staff and some wounded were transferred to a large building in Retimo. The grounds were very restricted and were occupied by over 2,000 Greeks. The building was in a filthy condition, which distressed the German senior medical officer to whom it was reported, and who thereupon had more Australian wounded flown to Greece. The remaining

wounded were sent to Greece on 1st June; the Germans refused to return records of admissions, discharges and deaths. On 3rd June the Australian medical staff was permitted to use a part of the building separate from the Greeks; this was a relief from the point of view of hygiene which was exceedingly primitive. The diet had been very poor the ration being unboiled rice and raisins, a little bread or biscuit and black tea, but was now somewhat improved. On 6th June the final movement of this detachment back to Greece was made. This necessitated a march of twenty miles, a severe ordeal for many of the men, whose boots were worn out. Eventually some vehicles were obtained.

Le Souef and the remainder of the ambulance parties who had been left behind at Sfakia were accommodated in various sites in the Suda Bay sector. Improvised shelters at Maleme were dirty and verminous. At Kalives in the buildings occupied a few short days ago by the 2/1st Field Ambulance conditions were better, but very crowded. There were 300 to 400 patients here at first, most of whom had beds. Marks of machine-gunning from the air were found, although red crosses were marked on the roof. At Canea the site of the 7th British Hospital was used and here too beds were found for most of the men. Rations were scanty, especially at Maleme which was really only a transit camp, but in other areas the bounty of the Cretans added rice, lentils and a little meat to the fare, and the men were allowed to pick grapes. Clothing was very scarce, largely owing to the action of the men themselves who had discarded it on the way to Sfakia. Many of them bartered clothing for cigarettes with the Greeks, and numbers of wounded were flown to Greece practically without clothing. Boots, worn out on the rock tracks and the spiny plants common on the island were little protection to their sore and tired feet. It is little wonder that the Cretans have a reputation for the making of good footgear. Some sea bathing was allowed at Canea. A few things could be still bought in shops, but a German threat to search men for money led Le Souef to call in any notes held by the men and destroy them, after recording credits in their paybooks. Some patients were taken by sea to Greece, under poor conditions; the more fortunate were flown back. Their physical state was only fair. Many suffered from an inadequate diet, mostly consisting of carbohydrates, and with a caloric value of about 1,400. After the first month it was somewhat improved, but eggs and vegetables were usually unobtainable except by the charity of local inhabitants.

The sick and wounded were fortunately not kept in Crete, but were promptly returned to Greece where they were treated by the Australian hospital left there under command of Major Brooke Moore. The remainder of the captured forces were later also sent to Greece; their experiences there and in prison camps in Central Europe will be told later.



Evacuation from Crete on *S.S. Lossiebank*.

(*J. C. Belisario*)



Major Susman at an aid post, Crete.

(J. C. Belisario)

APPENDIX I

Numbers of A.I.F. Troops in Crete

(Army Records)

Estimated total of A.I.F. in Crete prior to the attack	6,486
Total number evacuated (including 526 wounded)	2,887

Unaccounted for	3,599
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Complete nominal rolls of the number evacuated from Crete cannot be located, and the figure (2,887) cannot be checked but a careful investigation of the casualties in Crete gives the undermentioned figures—

A.I.F. prisoners taken in Crete	3,068
Killed in action—Crete (includes 35 killed during the evacuation) .	250
Died of wounds—Crete	24
Died of other causes	7
Members of the A.I.F., who after the fall of Crete June 1941, evaded the enemy and subsequently escaped and rejoined A.I.F. in the Middle East	155

TOTAL	3,504
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Accepting the number of evacuated from Crete as being correct the foregoing figures make the number of A.I.F. in Crete prior to the attack 6,391 or 95 less than the estimated figure of 6,486.

APPENDIX 2

Numbers of Troops from Crete landed at Alexandria

Date	Ships	Embarked	Number
Previous to 26/27 May			112
26/27 May	<i>Abdiel, Hero, Nizam</i>	Suda	930
28/29 May	<i>Orion, Dido, Kimberley, Decoy, Jackal, Hotspur</i>	Heraklion	3,486
28/29 May	<i>Napier, Nizam, Kandahar, Kelvin</i>	Sfakia	680
29/30 May	<i>Phoebe, Glengyle, Perth, Jervis, Janus, Hasty</i>	Sfakia	6,029
30/31 May	<i>Napier, Nizam</i>	Sfakia	1,510
31 May/ 1 June	<i>Phoebe, Abdiel, Jackal, Hotspur, Kimberley</i>	Sfakia	3,710
31 May/ 1 June	By air		54

16,511

Note: The figures given above are those supplied by the army from a count of those actually landed at Alexandria. These figures are only approximately correct. Those killed on passage are not included. Allowing for men killed on passage and for probable miscounting on disembarkation it is believed that about 17,000 troops were evacuated from Crete.

CHAPTER 14

SYRIA

LOOKING back on the happenings in the Middle East in 1941 it is hard to realise that the various military threats, dangers, losses and gains were not separate in point of time, but often embarrassingly consecutive or even contemporaneous. It is further significant how obscure was forward vision and how inaccurate prophecy. Thus, when the composite British force began to move to Greece on 5th March 1941 this phase of the programme was expected to be completed by 11th May. But before that date many events had occurred, stirring, ominous, or encouraging, all completely upsetting these estimates. Those who were serving in the Middle East at the time felt somewhat bewildered at the end of this momentous two months, though still capable of surprise when on 10th May Rudolph Hess landed by parachute in Scotland.

We have seen how swiftly the end came in Greece towards the end of April, and how the hoped-for holding of Crete became impossible in the face of a staggering concentration of German air-borne forces. While the fate of the combined British forces left in Crete was causing deep anxiety to General Wavell he was confronted with the possibility of operations in four other theatres of war, the Western Desert, Iraq, Abyssinia and Syria. The immediate reasons for worry concerned more than affairs in Crete, for the whole military situation in the Middle East was weakened by deficiencies. Naval losses had been heavy and only modified air support could be promised in future actions.

All forms of transport were exceedingly scarce, and armoured troops had only small quantities of reliable vehicles. The land forces available for enterprises over and above the present commitments in Egypt and the Western Desert were few. The 6th British Division had never been completely formed, and was only partially equipped, so too was a Polish brigade. The 4th Indian Division was expected to arrive from East Africa as soon as ships were available. The losses in Greece had been severe in proportion to the size of the force. In these the Australians had shared. The 6th Division A.I.F. was being rested, reinforced and re-equipped. The 7th Division had the 18th Brigade in Tobruk attached to the incomplete 9th Division, but was otherwise equipped and ready. The A.I.F. medical services had lost in Greece and Crete the equipment of two hospitals, a casualty clearing station, three field ambulances and a motor ambulance convoy.

With these slender resources added to the forces already committed, Wavell faced a threat of further armoured thrusts against Tobruk in Cyrenaica, although temporarily the German advance was checked. The 6th British Division, originally intended for action in the Dodecanese, and the 7th Australian Division were needed in the Western Desert, and the only reserves were Australian and New Zealand reinforcements.

All had not been well in Iraq for the past month. Pledged to help Britain in case of war, and to allow free passage of troops, the Iraqi had nevertheless fostered a strong pro-Axis feeling, and at the end of March the Regent was forced to seek British protection at Basra. A brigade group intended for Malaya was then sent from India to Basra but the Iraqis had become actively belligerent and menaced the slenderly held British Air Force Station at Habbaniya. Wavell had to call on the Middle East forces, and sent one cavalry brigade group, which advanced with the Arab Legion across the prepared communication route stretching from Haifa through Baghdad to Basra. This composite force repulsed the Iraqis and moved on to Baghdad, finally reaching there on 30th May. Arrangements were made for India to send further troops to constitute a division in Iraq. In Wavell's words, "we were very fortunate to have liquidated what might have been a very serious commitment with such small forces".

Meanwhile, since early in May, Germans had been steadily infiltrating into Syria, with connivance of the pro-Vichy French faction, represented by General Dentz, the High Commissioner in Syria. The determined resistance of the British Empire forces in Crete, and the heavy losses of the Germans, both in men and aircraft had lessened the immediate risk of a German invasion of Syria, but the potential dangers were clear. Wavell realised the perilous position of Egypt particularly in the Canal Zone, of Cyprus and of Turkey should Syria fall into German hands. The British Chiefs of Staff, well aware of the situation, instructed General Wavell to prepare a force to send into Syria. Wavell expected that the Vichy French would not resist German penetration, but examined the possibility of enlisting the aid of the Free French forces. At Qastina in Palestine, at the wish of General de Gaulle six Free French battalions were collected under General Legentilhomme, with some artillery and tanks; like most other available troops they were short of transport and lacked some equipment.

On 18th May General Catroux, Free French Commissioner in the Middle East, informed General Wavell that the French in Syria were withdrawing to Lebanon and handing over the rest of Syria to the Germans. Wavell was too cautious to allow this report to hasten him into rash procedures, and later information proved it to be false. However, some risk had to be taken, even at the cost of weakening the defence of Egypt, and on 25th May he reported to the War Office that he was preparing plans for entering Syria. He considered that at least a corps was necessary, with an armoured division, but, unable to satisfy these requirements, he thought that by 7th June he could assemble a force that could undertake the operation. This force consisted of the 7th Australian Division, less one brigade, the Free French troops, part of the 1st Cavalry Division, and the 5th Indian Brigade of the 4th Indian Division, just arrived from the Sudan. General Maitland Wilson had charge of this composite force. The 6th British Division was not then ready for incorporation in the force;

the necessary transport was lacking, and as this could not be taken from active troops its arrival from overseas was awaited.

THE PLAN OF ATTACK

The general plan was an advance into Syria on a broad front. The 7th Australian Division was allotted the task of moving across the southern Syrian border in two columns, one along the coast, the other along the central area east of the Lebanon Range. On the right the 5th Indian Brigade concentrated near the border and was to occupy Deraa, when the Free French troops were to come through and advance to Damascus. The British force was to come up from Iraq towards Aleppo.

The very use of Free French troops was expected to increase Vichy resistance, though some optimists thought that propaganda, even from loud speakers, would induce the French in Syria to weaken. Only very moderate air cover was available, and some of this was needed to protect a naval squadron which supported the advance along the coast.

TERRAIN

The Lebanon and Syria lie between the irregular boundary with Palestine on the south, and the Turkish boundary on the north, which runs a little north of Latakia and Aleppo. The great spine of the Lebanon Range rises almost from the sea in places near the Mediterranean on the west, leaving only a narrow strip traversed by the coastal road from Acre in Palestine. This strip is fertile in parts, with several important towns. Towards the south this coastal belt is encroached upon by rough rocky spurs of the mountains, through which the coast road passes through a tunnel at one point. At Tripoli the main peaks of the Lebanon Range and the wild foothills flatten into plains and valleys stretching north to Aleppo and farther east. This mountainous southern half of coastal Syria has few cross roads and is almost impassable in parts except with difficulty on foot. The attractive plains to the north are watered by the Litani and the Orontes Rivers, and east of these again rises the Anti-Lebanon Range, beyond which the Marada River fertilises the region around Damascus. The eastern slopes of the Anti-Lebanons are rough and often precipitous, and beyond Damascus lie flat dry plains merging into desert, from which rise occasional mountainous areas.

Two good roads run north across the Palestine border, one from Acre on the edge of the sea, often running through rocky spurs of the Lebanese foothills, another from Tiberias to Metulla. Between Tiberias and the border lies a highly malarious zone, around the rushy Hula marshes, and north of Metulla the road runs through deep gorges connecting near Merdjayoun with a good cross road to Sidon on the coast. Tyre and Sidon have lost their glory but their ancient names live on. Syria is also accessible from Palestine by a fair metalled road through Safad and Kuneitra to Damascus. From Damascus roads run north to Homs on the well-watered plain, west to Beirut, south to Deraa and east across the desert to Baghdad.

MEDICAL PLANNING

The medical planning for the campaign in Syria and the Lebanon had two distinct and important phrases, preparations for the care and disposal of sick and wounded, and preventive measures against endemic disease. The secrecy which surrounded the military preparations had some inhibitory effect on medical planning. All possible steps were taken to conceal the details of the military plan. The 7th Division in orders and signals was known as "6th Australian Division Exporter" and later as "Aust. Div. Exporter". This was a useful device for confusing the enemy, especially when signals were intercepted, but in a country full of potential agents security was hard to maintain. Ostensibly the 7th Division was to be used in the Western Desert, consequently adequate precautions against endemic disease were not taken in advance, on the grounds that these would have involved instruction of troops in the use of special equipment. The greatest medical hazard was malaria, with which no Australian troops had yet made intimate contact except for very brief periods.

All available technical information was obtained beforehand, but some of the medical intelligence concerning Syria was suspected to be unreliable, especially that emanating from the French health authorities. Experienced observers were available for advice, such as the officers of the Palestine Public Health Department, Dr Mer, director of the Malaria Research Station at Rosh Pinna, maintained by the Hebrew University at Jerusalem, and experts of the R.A.M.C. Colonel Fairley, Consulting Physician to the A.I.F. and Adviser to the Middle East Force on Tropical Disease, Colonel J. A. Sinton and Lieut-Colonel H. W. Mulligan, I.M.S., Consultant Malariologists to the Middle East Force and the British Force in Palestine and Transjordan respectively, were a distinguished trio available for advice and active work with the invading force. Fairley has pointed out that, although a reconnaissance of the Palestine-Syria border was carried out and a conference of experts held, these were last minute measures, and the malariologists were not consulted during the phases of forward planning. Had this been done earlier more emphasis might have been laid on the assembly and distribution of material for prophylaxis and on the importance of seeing that the men appreciated the necessity of using it properly.

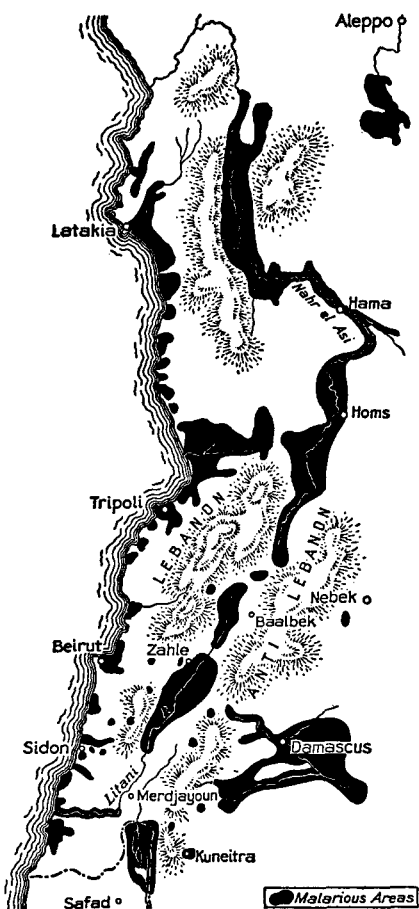
A preliminary survey was carried out in the border region by Colonel Disher (A.D.M.S. 6th Division, A.I.F.), Major Carruthers (D.A.D.H. I Australian Corps), and Captain Drummond (2/1st Field Hygiene Section). Only ten days elapsed between this reconnaissance and the entry of the troops into Syria. This survey emphasised the well known risks of the low lying country west and north-west of Rosh Pinna around the Hula marshes, and in the Jordan Valley. These areas were not like the parts of Palestine occupied by A.I.F. training camps, which were virtually free of malaria. The risk in this region may be illustrated by an example given by Dr Mer at Rosh Pinna. Arabs in a settlement in the Hula marsh district lived in reed huts, which accommodated an average of five persons at night. Mosquito counts in the mornings usually disclosed 1,000 female

anophelines in each hut, which would bite every second night. Since the local sporozoite rate was 3 per cent it followed that every person in one of these huts would be bitten by an infective mosquito at least three times every night. Benign tertian malaria occurred chiefly in May and June and malignant tertian chiefly in October and November in this area, where the Public Health Department of Palestine gave great help and cooperation in control. The chief vectors were *Anopheles elutus*, *superpictus* and *bifurcatus*, their breeding places were respectively swamps, cold upland streams and dwellings.

On the eve of the entry of the troops into Syria a special conference on malaria was held at force headquarters at Jerusalem. This was attended by Brigadier Allman Smith, D.D.M.S. British Force, Colonel Johnston, D.D.M.S. I Australian Corps, Colonel Sinton and Lieut-Colonel Mulligan, malariologists, and Lieut-Colonel P. J. Capon and Major Carruthers, the Deputy Assistant Directors of Hygiene of British Force and I Australian Corps. It was agreed that the whole of Syria must be regarded as highly malarious and that firm anti-malarial measures must be adopted at once. Personal prophylaxis was essential, using nets, protective clothing, repellent cream; destruction of mosquitoes and larvae was also necessary so far as campaign conditions allowed, and suppressive quinine would be needed later. The details of malaria control for the 7th Australian Division were carried out by 2/2nd Field Hygiene Section under Major D. G. Croll.

Sandfly fever, by which most of the units concerned had already been attacked, was widely distributed, and dysentery of bacillary and amoebic types was common in the country. Experience in Palestine and the Western Desert showed that skin disease might be expected.

In the last weeks of May medical units were already stationed in the north of



Syria: malarious areas.

Palestine. The 2/1st Australian Casualty Clearing Station under Lieut-Colonel H. McLorinan was at Nazareth, and the 168th British Field Ambulance under Lieut-Colonel Robb at Haifa, both ready to fulfil a stationary role in the reception of patients. Good ambulance trains and road service were available to southern Palestine, and to Jerusalem. Ambulance cars were stationed at Rosh Pinna, Haifa and Nazareth. Patients from British units stationed in northern Palestine were sent through the 168th Field Ambulance in Haifa to the British hospital at Sarafand. It was proposed that an Australian surgeon and some additional staff should be attached to this field ambulance and that Australian patients should be sent to the 2/7th Australian General Hospital near Rehovot and the 2/1st Australian General Hospital at Gaza.

The details of malarial control work would be supervised in the areas near the border by the field hygiene section, but the appointment of special anti-malarial squads in all units was also immediately necessary. Personal protection for troops in northern Palestine at this time (19th/21st May 1941) was not satisfactory. No mosquito nets were available, though head veils and gauntlets had been issued for use by guards. Quinine was available in Palestine but no suppressive treatment had been started as yet. Mosquito repellent, officially known as Dover's Cream had also been issued in bulk for the troops in the area, and containers for this rather sticky and uncomfortable compound were ready. However, Johnston had difficulty in the actual supply of repellent in the field, and also in getting nets for the men coming north. Protective clothing was not yet to hand, though ordnance services promised that long trousers would be supplied later. The shorts supplied to British troops which could be converted to long trousers by turning down "flaps" were unpopular, at least with Australians whose usual reaction to them was cutting off the flaps. By the beginning of June 3,000 nets were promised for distribution to the Australian units of "Exporter" Force, and these units were able to obtain protective clothing and cream. Sixty thousand nets had been lost in Greece, and though 80,000 were promised from India by June they had not come to hand in time for the opening of the campaign. The British Army stores at Sarafand held about 10,000 nets. No order had been given for the administration of suppressive quinine, though Colonel Sinton thought that all troops in northern Palestine should take it. The medical advisers of the army realised that even one night spent in a malarious area such as some of those close to the border might have a significant result on the subsequent course of operations if sufficient precautions were not observed.

THE OPENING OF THE CAMPAIGN

At midnight on 7th June 1941 the advance into Lebanon and Syria began. The Australian forces were chiefly in two columns, one striking up the coast, the other through Merdjayoun to Rayak. The 5th Indian Infantry Brigade was set the task of securing the line Ezraa-Sheikh Meskine so that the Free French force might pass through Deraa and take Damascus. Independent forces, "Habforce" and another force from Iraq

advanced on a long slant across the desert. The Australian forces in the coastal and central sectors were not then concerned with the medical affairs of the troops which had Damascus as their objective.

During the opening phase of the advance one field ambulance was under the command of each of the two Australian brigades. The 2/6th Australian Field Ambulance (Lieut-Colonel G. B. Gibb Maitland) together with a section of the 14th British Light Field Ambulance (Lieut-Colonel Parr) was under the command of the 21st Australian Infantry Brigade, and the 2/4th Australian Field Ambulance (Lieut-Colonel S. H. Lovell) under command of the 25th Brigade. As these two columns were separated by considerable distance over hilly country at this stage this was a more direct and satisfactory method of control than by the divisional headquarters.

The coastal column was delayed by the blowing up of the road at one narrow point where the spurs of the hills ran down to the edge of the sea. This had been expected and action taken to prevent it, but just too late. However, the delay was slight, and the column pressed on to the mouth of the Litani River. The necessary flanking movements demonstrated how difficult the country was for such manoeuvres, it was evident that the stretcher bearers would often have a task needing resource and stamina. Colonel F. Kingsley Norris, A.D.M.S. of the 7th Division, had decided not to set up main dressing stations as yet, but to take patients direct from the advanced dressing stations to Nazareth or Haifa. Once on the good roads running south the ambulance cars could make a quick comfortable trip. Between these centres and the forward stations a car relay post was established.

The 25th Brigade met with much more resistance inland at Merdjayoun. The "A" and "B" Companies of the 2/4th Ambulance worked directly under the brigade and sent patients on to the relay post at Rosh Pinna, while its headquarters and main dressing station were under the control of the A.D.M.S. at the hospice at Tabigha. The 2/2nd Field Hygiene Section was here also. On the right flank a British battalion captured Kuneitra promptly, and the Indian and French forces farther east were also advancing on their objective.

By the following day, 9th June, the initial attack was slowing down. At the mouth of the Litani a Scottish commando unit was landed north of the river but suffered heavy losses. The resistance was strong and the natural barriers considerable. Both companies of this ambulance were attached to a battalion: "B" Company was already working with the 2/27th Battalion at an A.D.S. three miles north of the bridge over the Litani River, and the intention was for "A" Company to "leapfrog" over "B". This move was prevented by a threat of a counter-attack on the right flank, for it was thought unwise to have both bearer companies north of the river until the position became more stable. Meanwhile the vehicles of the motor ambulance convoy were brought up to the A.D.S. at Tyre, and though they had to come forward under fire to move casualties, had no trouble in taking sick and wounded thence back to Haifa. The 2/16th



Syria.

Battalion suffered heavy casualties here, chiefly due to enemy mortars. In order that the medical officer, Captain D. Wilson, could clear his R.A.P. it was necessary for the first time for an ambulance waggon of the 2/6th Field Ambulance to move forward under fire. Some organisation of stretcher parties was also necessary to bring in the casualties of the 2/14th Battalion promptly, and Captain D. G. Duffy, the R.M.O., ensured that all bearers, regular and volunteer, were equipped to apply dressings and relieve pain. The central prong of the attack on Merdjayoun had halted, needing more artillery support, and aid posts could not be advanced any further.

At this stage the anti-malarial measures for the 7th Division were thought to be well in hand. Control in its fullest sense was not practicable, but stress was laid on personal protection. Arrangements were far from perfect, however, as many soldiers and airmen still did not have protective clothing. It would have been remarkable if troops with no tropical experience had not already acquired malarial infection either while waiting at the border or when held up in the highly malarious coastal and central areas.

By 10th June the action on the left flank had reached the Litani River. An advanced dressing station was able to proceed a little north of Tyre, and the cars could clear patients direct from there. "A" Company of the 2/6th Field Ambulance cleared all casualties in its area, and the light section of "B" Company reinforced the R.A.P. of the 2/27th Battalion, and moved on. As the advance was rapid it was not practicable to have all casualties carried back to the R.A.P. of the 2/27th Battalion, for the fighting companies would have been left without stretcher bearers to attend the wounded, so casualties were collected into small groups and word passed back to the R.A.P. to collect them.

The position in the central sector remained stationary. "A" Company of the 2/4th Field Ambulance was carrying on the work of an A.D.S. and so far finding a mobile A.D.S. useful; "B" Company was in reserve in open bivouac. There were few casualties, fifty-one A.I.F. and two British up to the 10th June. The field hygiene section staff were supervising malarial control in this area.

On the right the Free French troops were coping with slight resistance, and were advancing on Kiswe, south of Damascus. The forward requirements of these troops were met by their own *Groupe Sanitaire* and the Hadfield Spears Unit. This unit was a voluntary organisation, raised and administered by Mrs Edward Spears, better known as Mary Borden, the novelist. Its work in Syria was chiefly for the Free French forces. It was completely and elaborately equipped, had X-ray facilities with technicians, and the surgical work was done by several French medical officers. There were eight trained nurses in the unit, and eight women drivers. Technically the unit was responsible for its own supplies, but this was not always carried out in practice, as the I Australian Corps assisted the unit in Syria in this way, indents being marked as for the Free French. The Indian brigade on the right was served medically by the 14th Indian Field

Ambulance, commanded by Lieut-Colonel B. D. Khurana. Patients were sent south by the usual evacuation lines and accommodated in an Indian general hospital at Kafr Balu in Palestine near Rehovot.

Next day stiff fighting was still going on at the mouth of the Litani River, especially to the right of the position where an Australian flanking attack was met by a Vichy counter-attack. This required some alterations in the medical dispositions. Till the French positions on the north bank could be taken, "A" Company of the 2/6th Field Ambulance was kept south of the river where it was joined by its light section. For the same reason the section of the 14th British Light Field Ambulance was sent farther back. On the left of the 21st Brigade position, "B" Company of the 2/6th Field Ambulance was able to keep its advanced dressing station north of the river. Here the ambulance cars were able to come well up to the front.

In the centre the enemy still resisted strongly especially along the road north from Metulla, but during the day Merdjayoun was occupied. Further forward movement was planned, and Colonel Norris instructed the M.D.S. of the 2/4th Field Ambulance to move to the police post at Metulla, while the "A" and "B" Companies prepared to move with their columns toward Rayak. A special force known as "Todforce" was organised for the forward advance planned through Merdjayoun. The medical requirements of this force were supplied by a section of the 14th British Light Field Ambulance.

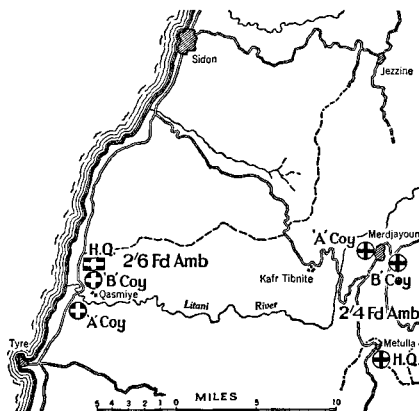
On this day suppressive quinine was started in the force, and certain areas were declared highly malarious, so that prophylactic measures could be taken and tightened there as the situation permitted. These areas were the north of Palestine, excluding the Haifa-Nazareth-Tiberias road; all parts of the Jordan Valley; and all parts of Syria including Lebanon. Orders were issued that nets must be used by all ranks, long clothing worn and protective cream used at night; veils and gloves were to be worn by guards at night; breeding grounds were to be controlled, and 5 grains of quinine taken by all ranks daily. Though suppressive quinine was issued to the 21st Brigade on 11th June and there was "some talk" about nets and individual containers of Dover's Cream, neither of the latter had been issued, although the brigade had been exposed to a fairly high malarial risk six days earlier.

REARRANGEMENTS OF FIELD AMBULANCES

Further rearrangement of ambulance groups was made on 12th June. On the coast the same relations were resumed between ambulance companies and the battalion groups as when they entered Syria. Now that the battle for the Litani River was resolving in our favour and both banks were held, the ambulance cars could evacuate direct from the advanced dressing station of "A" Company south of the river, and from the main dressing station north of the river just established by the H.Q. Company of the 2/6th Field Ambulance in the site of the A.D.S. set up by "B" Company two days earlier. Throughout the action this "leap-frogging"

manoeuvre was practised with very satisfactory results.

At Merdjayoun Major J. S. Crakanthorp's company of the 2/4th Field Ambulance was able to occupy a school building, and Major A. F. Hobson's company was in a valley a little to the east of the town. No deliberate surgery could be undertaken there. The headquarters of the ambulance still remained at Metulla, and patients requiring surgery were taken on to the casualty clearing station at Nazareth. At this unit observation of some of the casualties threw light on the conditions forward. Several cases of



Syria, 12th June 1941.

recent gas gangrene infection were recognised, owing to contact with more highly cultivated soil, and in some instances too, to unavoidable delay of some hours in bringing severely wounded men from places most difficult of access. In some instances it had only been practicable to pick up wounded at night in Bren carriers. Even after arriving at a dressing station men needing surgery had to travel another four hours to reach Metulla. In a few instances men with wounds of the lower extremity involving the femur arrived without Thomas splints. This was later the subject of investigation and enquiry. At the instance of Colonel Norris, Lieut-Colonel Lovell inspected the conditions in a typical forward battalion aid post, the 2/31st Battalion, where the R.M.O., Captain Kenny, was working in an exposed and stony wadi; he expressed the opinion that a Thomas splint could not be properly applied there. The question of the type of work which could justly be carried out in the aid posts must be deferred for the present.

Conditions on the coast were stabilising by the 13th, though Captain W. M. Irwin's company of the 2/6th Field Ambulance had to move to a safer place on account of air attacks on a battery of the 2/4th Field Regiment in the vicinity.

MERDJAYOUN AND JEZZINE

In the central sector sustained resistance continued in the hilly country north of Merdjayoun, and a further change of plan was made. The 25th Australian Infantry Brigade Group was now sent across with the objective of taking Jezzine, and thus removing a threat to the landward flank of the 21st Brigade Group on the coast. This involved an extremely difficult night move along an unknown mountain track, barely passable by any vehicles. The provosts, removing their shirts, so that drivers might glimpse their singlets, guided the traffic. After a hazardous journey in the dark the group reached Jezzine, and surprising its defenders, occupied the town

the next day. The defence of Merdjayoun and the responsibilities north of the town now passed to "Monforce", which was formed by reconstituting "Todforce" and placing it under command of Lieut-Colonel R. F. Monaghan A.I.F. "A" Company of the 2/4th Field Ambulance moved on with the 25th Brigade Group, thus isolating it still farther from its parent unit's headquarters.

The position now was that Merdjayoun was held, Jezzine occupied by the 25th Brigade Group, and the coastal sector was more stable, with the 21st Brigade Group in place on the Litani River. The advanced headquarters of 7th Division was near Tyre. On the right the position had not changed substantially, either with regard to the force at Kuneitra or that advancing towards Kiswe.

It was evident that synchronisation of the advances of the eastern, central and western columns attacking Syria was likely to prove difficult. The more mobile columns on the east had greater distances to compass, but those on the west had to traverse country admirably adapted for defence, and, as had already been proved, likely to be contested bitterly step by step. In terms of organisation of medical services, the Syrian campaign followed the classic model of evacuation never again to be realised in such text-book fashion during the war as Australians saw it. Once the first stages of transport of the wounded were past the passage to the main dressing station, clearing station and hospital was smoothly made. But these first stages were the slowest, the most laborious, the most hazardous, and even with all the care and gentleness of bearer parties, needed fortitude on the part of the patient. In this rugged country it was at times difficult to find wounded men, and still more difficult to carry them out. Even the best roads often ran through precipitous or stony country, or past thick plantations whose lush growth impeded movement. On one occasion Captain Viner Smith went out by night with an ambulance waggon to pick up wounded men to whom Captain A. T. Harbison, R.M.O. of the 2/27th Battalion had gone out on foot. No casualties were waiting at the expected point, but later he picked them up, and found that the two miles carry had taken five hours.

Colonel Hailes, the Australian Consultant Surgeon, decided that emergency surgery should be done only in main dressing stations, and deliberate military surgery in the units in Haifa and Nazareth. Despite rapid and efficient transport thither and prompt handling, delays were often unavoidable. The 7th Australian Division was then holding thirty-seven miles of front. Resuscitation, treatment of haemorrhages other than first aid, treatment of sucking wounds of the chest and severe abdominal wounds could be handled only at main dressing stations. With the campaign a week old it appeared as if the situation might soon permit these stations to be brought farther north, for with this support of the 25th Brigade at Jezzine the 21st Brigade on the coast was in a stronger position. One of the greatest surgical needs was resuscitation in forward areas. On both fronts the field ambulances had been using dried serum for intravenous fluid

replacement, with every satisfaction. Norris nevertheless wanted to have small blood banks if possible.

The drive which had taken the western prong of the advance across the Litani River near the sea continued its impetus to Sidon. During this battle it was impracticable for the 2/27th Battalion to evacuate casualties, owing to the extremely rugged country, and some of the wounded had to be held at the R.A.P. for periods up to forty-eight hours. After a hard sustained struggle our troops captured Sidon, and Irwin's company of the 2/6th Ambulance was able to establish itself there, while Mugford's company prepared to move into a hospital in the town.

Elsewhere the prospect was less favourable. On the right the British force which had occupied Kuneitra was now being assailed by tanks, and its tenure of the position was uncertain. Farther east the enemy had attacked Ezraa from the east, and pushed the Transjordan Frontier Force back to Sheikh Meskine. Closer to the coast fresh misadventure befell, for on the same day on which Sidon fell to the Australian 21st Brigade, the French counter-attacked and recaptured Merdjayoun.

On the afternoon of 15th June, a difficult and confused position arose with regard to the evacuation of casualties in this central area. The main dressing station of the 2/4th Field Ambulance was still at Metulla, some eight miles from Merdjayoun. The commander of the ambulance, noting the withdrawal of some of the Australian forces, and the increased southward traffic through Metulla, realised the need for readjustment of ambulance posts. The hasty southward traffic gave evidence of considerable confusion and even a degree of alarm. Lovell could glean little information from troops returning from forward areas except that they had been told to retire. He sent Captain Gordon Rowell forward to investigate the position of Hobson's company at Qleaa near Merdjayoun, and decided that withdrawal was necessary. Norris pointed out later that it appeared that the troops in Merdjayoun interpreted patrolling cars and gun-fire as a full tank attack, and retired. Lovell now tried, unsuccessfully, to make contact with Colonel Norris or his deputy Major Williams, but notified the divisional headquarters that there appeared to be a heavy enemy attack on Merdjayoun and to the south of the town. Failing instructions, he therefore moved his "B" Company back to Metulla, and the headquarters with the M.D.S. back to Tabigha on Lake Tiberias. His message reporting his action to the divisional headquarters seems to have been the first report received there on the events of the afternoon. "B" Company together with the light section of the 14th British Light Field Ambulance, which had been caring for the medical needs of the rather slender force in Merdjayoun, retired to El Khalisa. Although the Vichy French were too cautious to occupy Merdjayoun till the following day, the 16th, there would have been a risk in leaving part of a medical unit so far forward. During the previous week Metulla had been the only likely position for an ambulance headquarters in this sector, though not an entirely suitable one, so close to a rugged area where military movements had proved difficult. Merdjayoun was really the key of this central area, controlling

the lateral road to the coast, the central road to Kuneitra, and through Metulla to Rosh Pinna. Once the headquarters of the 2/4th Field Ambulance retired from Metulla it could not well set up north of Tabigha, owing to the highly malarious nature of the intervening country. These moves did not involve any interruption of the evacuation of casualties. Only a battalion was then left at Jezzine, and a new force, "Berry" Force, was formed to concentrate in one command all available troops in the Merdjayoun sector.

Meanwhile, the Free French had captured Kiswe on the road to Damascus, but on the following day Kuneitra was heavily attacked and recaptured by the Vichy French.

Major F. N. Chenhall, with the headquarters of the 2/4th Field Ambulance, after retiring to Tabigha, opened a main dressing station in a hospice there on the 16th. It was now impracticable for the forward elements of this unit to send sick and wounded back to the parent body, for Crakanthorp's company was at Kafr Tibnite near Jezzine with a light section nearby, and the road between Kafr Tibnite and Merdjayoun was in enemy hands. Therefore casualties were diverted to the 2/6th Field Ambulance by ambulance car from the 14th British Light Field Ambulance.

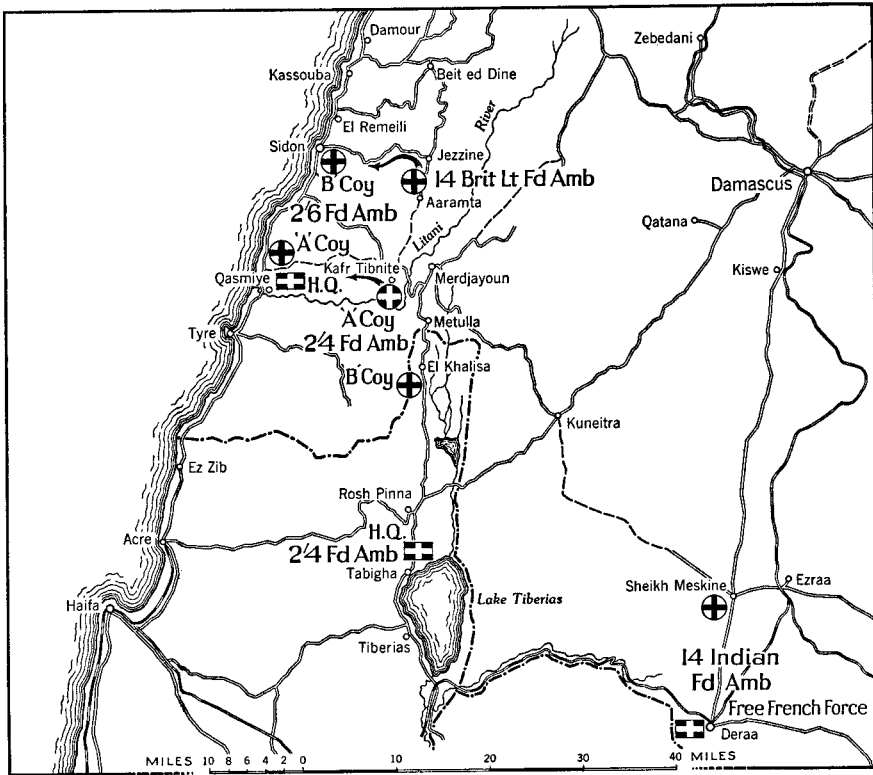
The next day a British force recaptured Kuneitra. Doubt was felt at first about the propriety of sending reinforcements and ammunition from Rosh Pinna, but after a certain degree of confusion this was done and the Vichy French were again driven out.

The 25th Brigade asked for assistance against a threatening force in the central sector, and to meet this troops were sent from the 21st Brigade on the coast, which was in turn reinforced by troops of the 16th British Brigade. This did not disturb the medical arrangements on the coastal sector. The 2/2nd Field Hygiene Section was now in this area, doing useful work particularly in malarial control. About this time the number of febrile patients arriving at the 2/1st C.C.S. at Nazareth attracted attention. They were tentatively labelled as "P.U.O.", but the need for exact malarial diagnosis was evident; therefore arrangements were made for the 1st Mobile Bacteriological Laboratory to be stationed at Nazareth. In the 2/1st and 2/7th Australian General Hospitals also numbers of febrile patients were observed, and routine blood examinations proved many of these were suffering from malaria.

I AUSTRALIAN CORPS COMMANDS

Lieut-General J. D. Lavarack handed over the command of the 7th Australian Division to Major-General A. S. Allen on 18th June, and assumed command of I Australian Corps, which henceforth had control of the whole operations. The incomplete 6th British Division, which had been in Egypt, had by now been equipped and sent to the Rosh Pinna area in Palestine, and came under the administration of I Australian Corps as from 21st June.

The medical arrangements were as follows. The coastal sector as before was served by the 2/6th Australian Field Ambulance. In the Jezzine-Beit ed Dine Sector the headquarters and two sections of the 14th British Light Field Ambulance and "A" Company of the 2/4th Australian Field Ambulance sent on patients to the 2/6th Field Ambulance on the coast. The headquarters of the 2/4th Field Ambulance at Tabigha acted as the main dressing station for the Merdjayoun-Kuneitra sector, with its "B" Company carrying out evacuation of patients. The route from Kuneitra



Syria, 18th June 1941.

led by the Rosh Pinna road to Tabigha on Lake Tiberias. The Hadfield Spears Unit and the M.D.S. of the 14th Indian Field Ambulance were at Deraa, while the *Groupe Sanitaire* looked after the Free French forward on the right flank. Patients from these areas on the right were sent through to Nazareth, and those from the coast and the centre to Haifa. The 2/13th Australian Field Ambulance, which Johnston had been anxious to have on hand for some time at the disposal of the corps, had now arrived, under command of Lieut-Colonel W. H. Ward.

On the 19th there was heavy fighting around Jezzine and Merdjayoun, with a considerable number of casualties. During a period of eighteen

hours following the attack Crakanthorp passed 100 casualties through the A.D.S. of the 2/4th Field Ambulance at Kafr Tibnite. Most of the wounded came from the 2/2nd Pioneers and the 2/25th Battalion. The 14th British Light Field Ambulance, served this area also, and had sections on the Kuneitra road and at El Khalisa, a small village near Merdjayoun.

Further attempts were made to recapture Merdjayoun without success. The Vichy French used tanks to which no immediate reply could be made, and as the positions of the 2/25th Battalion became untenable, this unit was withdrawn to the Litani River. In this engagement an extensive area had to be covered in attending to the wounded. Captain A. M. Johnson R.M.O. of the 2/5th Field Regiment worked for forty-eight hours organising stretcher parties and treating the men: he even recruited local Arabs to bring isolated wounded on donkeys and horses from the surrounding high country. On one occasion twenty-six men took five hours to bring in eight seriously wounded soldiers.

The next day General Lavarack informed the 7th Australian Division that the weight of the attack would be brought to bear against Damascus, instead of pressing north to Beirut. In the central sector Merdjayoun was still a weak spot, but Allen felt able to hold on to the existing line. Illness was causing rather alarming depletions in some units in the centre; infections and mental and physical exhaustion were taking their toll. In the 2/4th Field Regiment some respiratory infections were occurring, and pyrexial illness strongly suspected to be malaria was frequent. Enough nets were not to hand for all the men, and the supplies of quinine were irregular. On the right even after the British recapture of Kuneitra the enemy still held Qatana and the road to Damascus, but the Indian brigade captured high ground west of Mezze, overlooking Damascus. Though the cost in casualties was heavy, the position was much bettered by this action, and when the Damascus-Beirut road was cut shortly afterwards, the Free French were able to launch an attack on Damascus.

On the 21st no great change occurred, but the central zone flared up into some activity, and areas north of Metulla were subjected to shelling. Some improvements in road transport had been effected in this sector, notably by by-passing the dangerous exposed areas south-west of Jezzine known as "the mad mile", with its sheer drops from the road to the valley below, and its lack of protection from gun-fire. The approach to Jezzine either east from Sidon or north from Merdjayoun was within the range of French artillery, which responded to any movement by fire. Colonel Norris in his constant movements among the frequently changing medical posts of the unit understated somewhat when he remarked that "little damage was ever done, but the final dash by daylight into the town down this mad mile was often a thrill". Merdjayoun by agreement of the brigade commanders, was judged to need a complete brigade to deal with it, with adequate air cover.

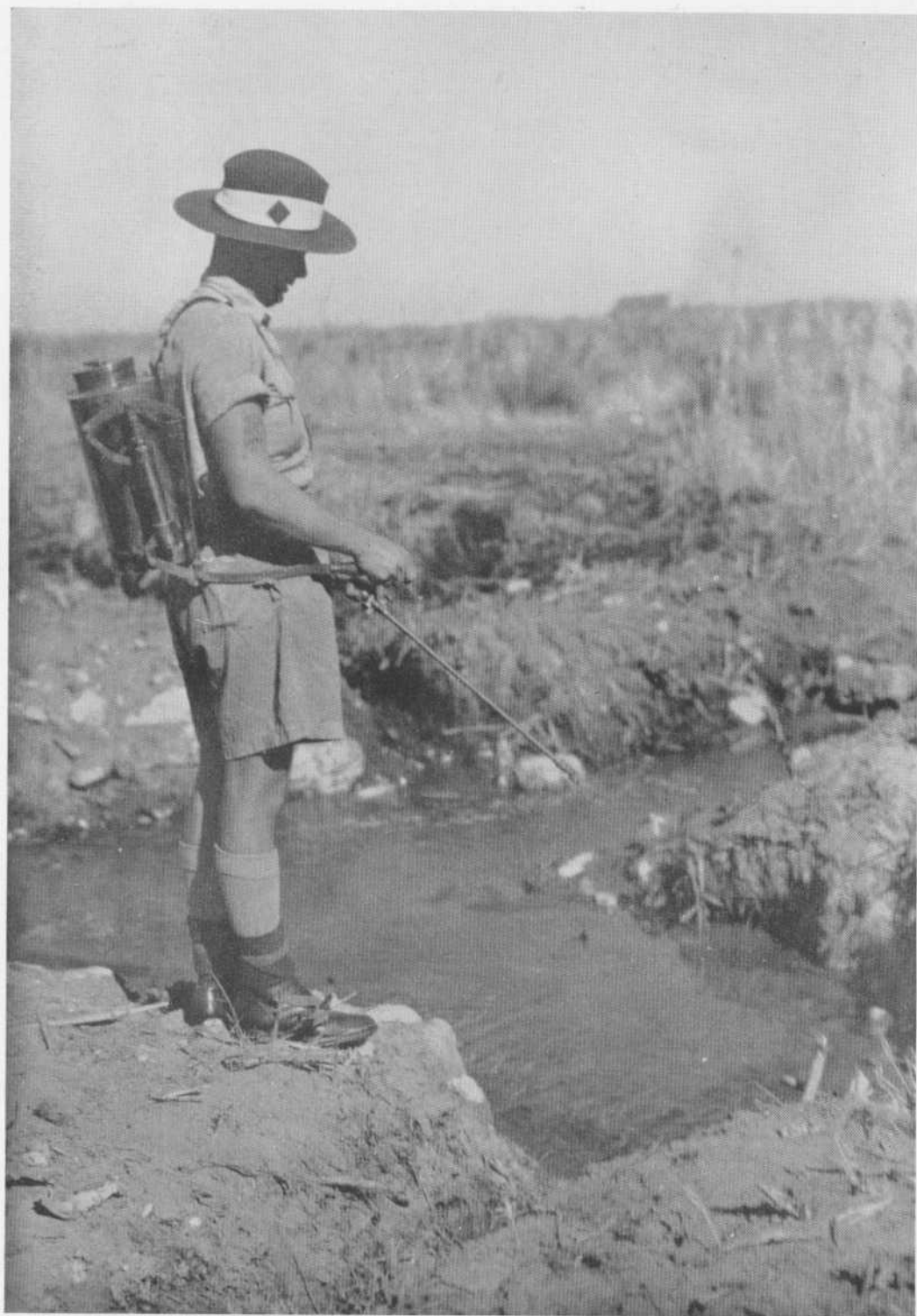
MEDICAL CONDITIONS

The effect of this stalemate type of campaign on the centre and left sectors of Syria was now noticeable among the men. There were many



Troops moving in rugged and exposed country to attack enemy positions near Jezzine, Syria.

(Australian War Memorial)



Anti-malarial measures, Syria.

(Australian War Memorial)

more admissions of sick than wounded men. A steady flow of casualties was maintained, and on 21st June the 168th British Field Ambulance at Haifa, which was hard pressed for accommodation, held 175 patients and had no empty beds. The 2/1st Australian C.C.S. then held 100 patients, and had 258 beds vacant. During the preceding twenty-four hours this unit had handled 78 wounded and 118 sick men. The most prevalent infections at this time were dysentery and undetermined pyrexia. In some of the fighting units the sick wastage was twice as great as the battle casualties. Exhaustion states were common, attributable to the arduous nature of the campaign, which had involved periods of intense physical activity and exposure to an active enemy. Some of the inexperienced troops suffered from fear states, especially when under air attack to which reply was not always available. Loss of sleep and lack of food were important factors, but there was no special evidence of salt deficiency. Numbers of patients who were promptly passed on to the hospitals in Palestine, were found to respond quickly to rest, sedation and food, with the encouragement of the staff and of other patients. Conversion hysteria was occasionally seen in the 2/1st and 2/7th Australian General Hospitals with various somatic fixations. Aphonia and vomiting were common symptoms seen in the 2/1st A.G.H. among these men. The diagnosis of fever had not been easily made up to this time except in the hospitals in Palestine, but the arrival of Major E. Ford with the 1st Australian Mobile Bacteriological Laboratory at Nazareth supplied an essential service.

Sandfly fever was prevalent in many areas, and hepatitis, which was to prove much more severe later on, was difficult to distinguish in the early stages. The hospitals were demonstrating more proven malarial infections, for the incubation period for men infected at the beginning of the campaign had now passed, and the results of exposure were manifest. Preventive measures in the field were improving. When the 6th British Division moved into Syria the D.A.D.H. of I Australian Corps, Major Carruthers, arranged that each unit should be given personal warning of the dangers ahead, and advised where anti-malarial stores could be obtained. Unfortunately full supplies were not yet available, and as this division arrived without any several weeks passed before every man possessed full preventive equipment. When the corps assumed command malaria control was supervised under Carruthers in three areas in the coastal (western) area, by Croll in charge of 2/2nd Field Hygiene Section; the central area (Rosh Pinna-Merdjayoun) in charge of Captain J. C. English, 2/3rd Australian Field Hygiene Section, and the eastern area in charge of Major J. Moffitt, R.A.M.C., of the 33rd British Field Hygiene Section. Lieut-Colonel Mulligan acted as Consultant Malariologist to I Australian Corps and beside advising on precautionary measures, helped greatly in improving the distribution of quinine. Small bush nets were held in reasonable numbers at three field ordnance depots at Tyre, Rosh Pinna and Deraa. Colonel Simpson, Assistant Director of Ordnance Services, arranged for

the drawing of nets from these depots and for the return of nets for reconditioning.

At midnight on 21st June the numbers of men admitted to hospital since the beginning of the campaign was as follows:

	Battle Casualties	Sick
Australian	542	520
British	70	100
Prisoners of war	122	11
Civilians	9	0
Royal Navy	24	24
Indian	4	8
Totals	771	663

Total admissions 1,434.

EASTERN SECTOR

Damascus was captured on the 22nd, and with the advance of the British forces over the desert towards Palmyra the Vichy French flank was weakened. In the centre and on the coast military activity was chiefly in the nature of patrols from Jezzine and Sidon. Maitland's ambulance took advantage of this period to prepare a mobile dressing station. It was evident that further substantial advance up the coast was not practicable till the Merdjayoun position was resolved and that a full scale operation against Damour would be necessary.

On the right the Headquarters Company of the 2/13th Field Ambulance was proceeding to Deraa to set up a main dressing station and was then waiting for its equipment to arrive. A plan was being prepared for this unit to establish a rest camp for the use of the 7th Australian Division and the 6th British Division whose two brigades were now available in Syria. Colonel Norris and Colonel Smyth, A.Ds.M.S. of these divisions were anxious to have this rest station set up, so as to save sending men back to Palestine. A site equally convenient for both formations was not easily found: one at Ez Zib on the coast was otherwise suitable, and it was hoped that this would be available in a few days.

Meanwhile Johnston proposed to use part of the 2/13th Field Ambulance in running a dressing station in Deraa. However, when the unit arrived the commander was informed by Colonel Anthonisz, A.D.M.S. of the 85 Sub-Area at Deraa, that he would not be required there, as the 14th Indian Field Ambulance had a dressing station working sixteen miles north. After a little delay the matter was adjusted, and as Ward's own equipment had at last arrived, he was able to return unopened panniers borrowed from the 168th British Field Ambulance in Haifa and open in the site being vacated by the Hadfield Spears Unit. This unit proceeded to Damascus, where a medical railhead was opening in a few days. The 14th Indian Field Ambulance, moved to Damascus also, and there set up in the British Mission Hospital. The 12th Indian Staging Unit which had been at Deraa was kept there for the time being. Shortly afterwards the

215th British Field Ambulance arrived at Haifa, and came on to Damascus to relieve the Indian Field Ambulance. The 9th British Light Field Ambulance was now at Kuneitra and established a staging post there.

Arrangements were made for an ambulance train to run every two to three days, according to need, to Deraa and thence to Affuleh, a journey of four to six hours. An equitable distribution of ambulance cars was made from the 2/2nd Australian Motor Ambulance Convoy and a section of the corresponding British Unit (7th M.A.C.). The latter was attached to the 6th British Division, and a sub-section of the former to the Hadfield Spears Unit. Things promised to run more smoothly in this sector, though as yet the enemy had not been dislodged from strongholds in the rocky hills to the west of Damascus. The most prevalent sickness in forward areas was undetermined pyrexia, some of which was certainly due to malaria; dysentery, exhaustion states were also common, and in addition the familiar ulcers on exposed parts of the skin, soon to be renamed "Syrian sores". The main dressing station at Tabigha was then holding about seventy men suffering from mild illness or nervous exhaustion. These men were shortly returned to their units, illustrating the value of this type of medical care, soon to be taken over by the rest camp at Ez Zib.

CENTRAL AND WESTERN SECTORS

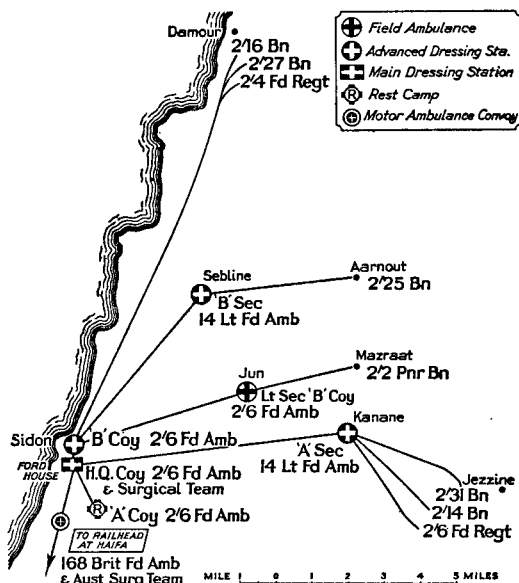
An attack on Khiam near Merdjayoun on 23rd June showed again the front line service in this part was arduous. Difficulty was experienced as before in collecting wounded in this rough country: two extra ambulances were needed to take men from the aid post. As part of preparations for renewed assaults on Merdjayoun, an advanced dressing station was formed near Jezzine, sending patients on from there across to Sidon. Since the opening of the campaign a total of 1,842 patients had passed through the 2/4th and 2/6th Australian Field Ambulances. A surgical team was now attached to the 2/6th M.D.S. at Sidon consisting of Major N. R. Wyndham and Captain N. H. Robinson. During the previous week this team had been attached to the C.C.S. at Nazareth, but they were likely to be needed farther forward. The other Australian team, which included Major F. W. Niesche and Captain W. M. Ada, had been stationed at Haifa with the 168th British Field Ambulance. Sidon was now an important medical centre, and likely to become more so, though the central position was still far from stable. After the fall of Damascus the French forces had some immediate successes east and south of the city, and the British brigade, including an Australian battalion, took over the forward positions from the tired Indian brigade. Qatana was captured, but the steep slopes of Jebel Mazar on the high land to the west of Damascus were too strongly held, and the position there became static, though active patrolling continued.

It will be seen that Australian troops were at this time represented in all areas from the coast south of Damour through Jezzine and Merdjayoun to Qatana and Damascus. Merdjayoun was still a pivotal point, and round the neighbourhood heavy fighting had continued. A number of small

villages were taken, but ever since the reversal of fortune there on 16th June the town defied capture. However, on the 24th patrols entered Merdjayoun, and the town was completely cleared of enemy by the 25th. Further attempts to drive the enemy from the hilly country to the north east of the town were unsuccessful, but General Lavarack after conference with the staff decided to concentrate on a drive along the coast towards Beirut. Another brigade of the 6th British Division came up to take over the Merdjayoun sector; this was placed under the control of the British division, but as there were difficulties in communications the command reverted direct to the corps.

A success was gained on the coast on the 26th when Kassouba, south of Damour, was outflanked on the landward side and taken. The Australian brigades at Jezzine and on the coast were reorganised, and the force assembled before Damour was reinforced by the 17th Brigade consisting of the 2/3rd and 2/5th Infantry Battalions recently returned from Greece, and the 2/2nd Pioneer Battalion. At this time an important administrative change was made in the medical arrangements; the field ambulances which had been under brigade control now reverted to the command of the 7th Division. Medical organisation in the Damascus sector was running smoothly. Ambulance trains began a daily service from Damascus to Amman, and thence to Jerusalem where British general hospitals were working. It was found, however, that this journey was unduly trying to severely wounded men, and these were usually sent to Tabigha and thence to Nazareth.

Further concentration of the medical units on the coast was effected on 27th June by bringing Crakanthorp's company of the 2/4th Field Ambulance across from the Jezzine area to Qasmiye on the coast, south of Sidon. This company had for some time worked almost independently, as it was separated by distance and by rough, hostile country from its headquarters, but now it came under control of the 2/6th Field Ambulance at Sidon. All movement of casualties by a southerly route from Jezzine now ceased and only the coastal route was used. Around Jezzine a growing concentration of men and material was preparing for coming events.



Evacuation by 2/6th Field Ambulance, 27th June.

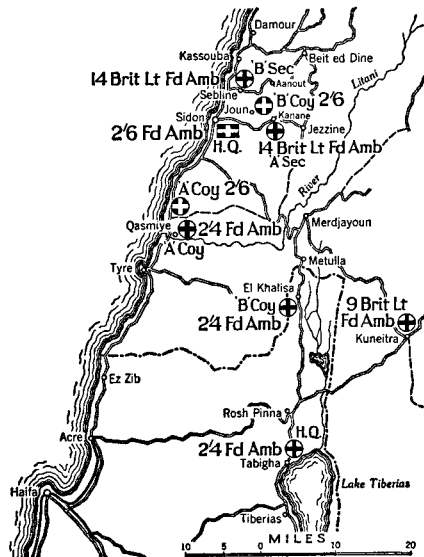
As part of the medical planning the M.D.S. of the 2/6th Field Ambulance was located in Ford House in Sidon, and here, staffed by the Headquarters Company, and helped by the attached surgical team it was prepared to carry out the role of a casualty clearing station. The previous site occupied by Major H. M. Fisher's company of the ambulance three miles north of the Litani River was taken over by a light section of its "A" Company to care for troops along the communication lines pending the expected arrival of the 2/4th Field Ambulance headquarters in the area.

By the end of June the medical arrangements were still further consolidated by the use of an advanced dressing station of the 14th British Light Field Ambulance in the Kanane area. This took patients from the 2/31st and 2/14th Battalions and 2/6th Field Regiment and sent them through the main dressing station in Sidon. Another advanced dressing station of the 215th British Field Ambulance's "B" Company served casualties from 2/16th, 2/27th Battalions and 2/4th Field Regiment on the coast; they too passed through Sidon. The 2/2nd Pioneer Battalion at Mazraat was cleared by the light section of "B" Company of 2/6th Field Ambulance.

An advance up the Litani valley had been planned, but this was postponed. At this time Hobson's company of the 2/4th Field Ambulance was at El Khalisa as no other post was desirable between Khalisa and Rosh Pinna on account of the highly malarious nature of the country.

The rest station of the 2/13th Field Ambulance was open in good time before the coming offensive. The other detachment of this unit continued to work at Deraa; though no battle casualties needed attention there, some 2,000 troops, chiefly British, with some Australian, and Free French, required routine attention. The Transjordan Frontier Force had its own medical section, which helped in addition in examining malarial films and supplying interpreters. The detachment of the 2/13th Field Ambulance stayed at Deraa for some time until relieved by a British unit after the campaign. Had more transport been available it would have been used on the coastal sector where the 14th British Light Field Ambulance was working.

On 1st July the headquarters of the 2/4th Field Ambulance at Tabigha was relieved by the 189th British Field Ambulance, which thus took over the service of the central sector of Syria. A number of convalescent



Syria, 27th June.

patients was sent to the rest camp at Ez Zib, which was now open and working. The 2/4th Field Ambulance then moved on to the coast north of the Litani River, and began to take "sitting" casualties from the front lines, while the more severely wounded were admitted to the 2/6th M.D.S. at Sidon where surgical teams were working. All patients well enough to travel were sent on as promptly as possible to Haifa or Nazareth.

ATTACK ON DAMOUR

During the next three days detailed preparations were made for the attack on Damour. The general health of the men was satisfactory on the whole. Mild diarrhoea was common, but usually responded to treatment in a few days; some of the affected men could be looked after in the rest camp. More troublesome were the infected sores which were spreading among the troops. These infections of exposed parts were so frequent that in many R.A.Ps. medical officers and orderlies spent a great part of their day in dressing sores. They were widely recognised as due to all varieties of trauma, with super-added infections made more potent by lack of facilities for washing. From now onwards this became a significant problem. During this period of relative lull, exhaustion states were little seen.

Many cases of malaria were occurring, of benign tertian type. The general anti-malarial organisation seemed satisfactory, but questioning of hospital patients revealed that the instructions concerning personal protection and the taking of quinine were not always followed. There was good reason to believe that the concentrating of troops near Sidon would later produce overt malaria.

Stored blood was being sent from the 60th British General Hospital in Jerusalem through Nazareth to Sidon. Ordinary "hot boxes" were used for carrying the bottles, which were kept packed in ice from the Sidon ice works. A temperature of 4° to 6° centigrade could thus be maintained.

Experience in the Litani River engagement had shown that the bearers needed assistance in moving wounded in hilly country: to this end Norris asked for twenty-four donkeys: the division supplied twenty mules. These with Cypriot muleteers were attached to the post in Wadi Kassouba with forty to fifty bearers under the direction of the light section of "A" Company of Maitland's ambulance. Bearer squads were distributed among other aid posts, for duty behind the posts, as it was not possible to bring up motor ambulances anywhere near them.

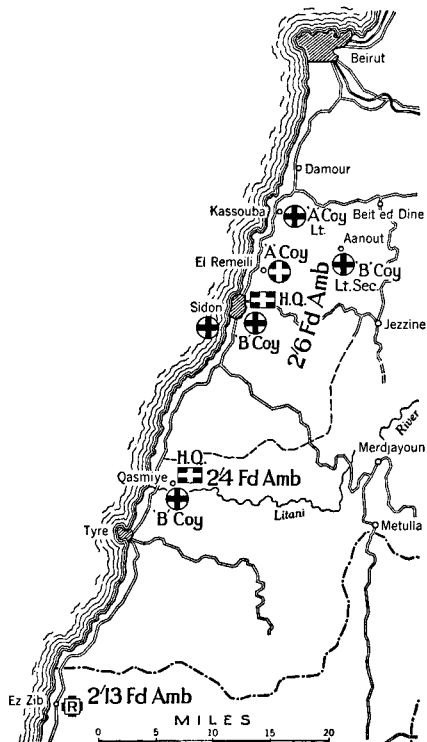
Johnston expected the transport arrangements would be quite adequate, but gave consideration to the question of bringing up another C.C.S. Allman Smith suggested that the 2nd British C.C.S. which was due to arrive at Haifa might relieve the hardworked 168th Field Ambulance there, but Johnston thought the time was inopportune for a change. This C.C.S. therefore stayed in the Haifa area and helped by supplying staff. The 2/3rd Australian C.C.S. was also partly ready at Gaza in Palestine, though much of the ordnance equipment was still lacking. The two sites suggested for it were Sidon, and Acre in the Sydney Smith Barracks. No

present action could be well taken, but movement of the light section of the 2/3rd C.C.S. to Acre was arranged in the hope that ordnance requirements could speedily be met there. On 4th July the 14th British Casualty Clearing Station opened at Damascus, thus adding to the medical resources in the eastern zone of Syria.

The attack began on the Damour-Ed Dine area on 5th July. The high ground of Beit ed Dine was strongly held by the French, who controlled the road running down into Damour. The approach from the south was winding and hilly, and made a natural defence, so too did the river which was bridged at Damour. Thick banana plantations grew along the coast line, and eastward of these the rocky slopes were well prepared to resist assault. The mountainous country farther inland was still rougher, but it was over these rugged eastern approaches to Damour that the assault must be made. After blocking the road to Beit ed Dine the Australian troops carried out this difficult flanking movement. One prong of the attack thrust up the coast line over the river, another pressed forward to Abey, north and inland of Damour.

After days of bitter fighting, with assistance from sea and air, the Australian force took Damour on the 9th. The next day Abey was taken, north and east of the town, and with the control of this high ground the issue was clear. For a couple of days fighting went on, but before the position could be consolidated by gaining complete control of the Damour-Ed Dine road and pressing on to Abey, overlooking Beirut, the Vichy French asked for suspension of fire. A "convention" was proposed, technically not an "armistice" and this was signed on 14th July two days after the instruction to cease fire. For a week the battle of Damour had continued. The number of casualties up to 10th July when Abey was taken was 255 sick and 145 wounded. The forward arrangements proved very satisfactory, though the mule teams did not prove a success in moving wounded, and were lent to the artillery to carry ammunition.

During the action very difficult conditions were often encountered in bringing in casualties to the aid posts. Ambulance bearer squads



Damour, 8th July.

were sent to R.A.Ps. for duty behind these posts, and as the 2/16th and 2/27th Battalions soon crossed the river some long carries were necessary. The forward road was not open for ambulance traffic for a time, and extra bearers were needed at the 2/27th R.A.P. Through difficulties in communications four squads arrived without having had a meal and without stretchers and equipment. Major Fisher at the A.D.S. soon remedied these deficiencies, and the bearers successfully completed a two and a half hours' carry. By the 8th July, despite the difficulties of the R.M.Os., no delays held back the casualties once they reached the R.A.P. The bearer squads displayed cool persistence and endurance of a high order, the ambulance drivers worked with care and skill and showed resource and courage, and the distribution of the ambulances and the organisation of forward car loading posts ran smoothly.

The staffs of the ambulances were kept working hard. At the 2/6th M.D.S. were two operating theatres and teams; two shifts of twelve hours were arranged for surgeons, nursing orderlies, clerks, cooks and general duty men, though these hours were often exceeded. Resuscitation was needed extensively, and reconstituted dried serum was given to seriously shocked men as a routine. As many as six blood transfusions were running simultaneously at one time in the 2/6th Field Ambulance M.D.S. Unfortunately trouble was encountered with infection of stored blood from Jerusalem. Several severe reactions occurred, and two men died. The investigations made following this tragic experience are described in the section on blood transfusion in Volume I. Thereafter during this campaign this unit only used fresh blood taken by Captain R. Officer of the 2/1st C.C.S. at the rest camp at Ez Zib and the convalescent depot in Palestine. Maitland left the surgical work to his staff and concentrated on the rapid bringing in of all casualties. It was evident to him during this battle that a field ambulance when busy could not do forward surgical work without the addition of a surgical team. Even so on this occasion the strain on the staff was great, and would have been greater still if the 2/4th Field Ambulance, stationed in echelon with the 2/6th had not taken all the less seriously ill and wounded.

The whole of the medical plan had gone well. Communications were not always easy, but usually were sufficient. On one occasion a medical officer, following the receipt of an indistinct telephone message that thirty wounded men awaited transport in a battalion aid post, made his way there after a perilous journey to find no patients at all. Six men had previously been removed by Bren carriers. Wounded had ceased to arrive at the field ambulances by the 13th and the worst of the problems of their handling were over. On the 16th General Wilson and General Catroux headed an enthusiastically received procession into Beirut, and operations against Syria were at an end.

Medical and surgical conditions encountered were in the main similar to those found on other action fronts. One important difference between surgical work in the Western Desert and in Syria was the greater danger of gas gangrene in Syria. This was an ever present risk in the highly culti-

vated areas, and sometimes evidence of infection was manifest soon after wounding. An officer was severely wounded in the leg while carrying out forward observation for artillery and was left perforce in an exposed position till after dark, when he fell into a banana grove and was not found till the next day. When brought in he already had gas gangrene in his wounded leg. The difficult conditions of living of the men were also conducive to infection as the persistence and number of "Syrian sores" showed. Dysentery and diarrhoea continued to cause wastage, but fortunately were of mild degree. As time went on a number of amoebic infections were traced to these weeks in Syria. One interesting detail noted during the quiet periods was that the size of dental parades increased noticeably.

During the Damour action more exhaustion and fear states were seen. Many of the men were sent to the rest station of the 2/13th Field Ambulance at Ez Zib, where they came under the care of Major Gwyn Williams, who was a psychiatrist by training. In a special report on the problems of battle neuroses he divided the causes into those which could and those which could not be controlled. Among the latter he placed long marches under very trying physical conditions, and annoyances such as insect pests and infections causing skin irritation. In the more avoidable causes he included the enlistment and retention of unsuitable men, occasional lack of food, and insufficient sleep. Possibly fatigue of responsible officers in turn tended to lower discipline among the men. An interesting observation with some bearing on fatigue was made by a number of officers, that during active parts of the campaign many men evinced greater desire for sugar. Sweet tea was popular, and if obtainable, sweets and chocolate.

In the turmoil of the battle little thought was given to malaria, except to try to fulfil the essential conditions of protection. But on the day on which the battle for Damour began Colonel Sinton and Lieut-Colonel Mulligan had seen several men with malignant tertian malaria from the Hula district. Some days later Major Ford presented an analysis of 115 cases of fever subjected to blood examination. Two were proved due to relapsing fever, fifty-one to benign tertian, and seven to malignant tertian. The question was whether this unobtrusive emergence of malignant malaria presaged an epidemic rise during the later months of summer, the period when this type of infection might be expected. The malariologists urged that the extra precaution should be taken of increasing the dose of suppressive quinine to 5 grains twice a day. The position about nets was still not satisfactory: 10,000 nets of the sandfly bivouac type had gone astray and a search was being made for them.

After Damour it was evident that there would be extensive movements of troops, camps would be established in areas which would need careful malarial survey, and much active anti-malarial work would be required. The greater freedom of troops not in action would also need a tightened hold on the discipline of personal prophylaxis. It seemed fortunate that the campaign was over at this time before more serious sick wastage of

men by malaria was added to the other losses of war. Even at the height of the battle for Damour there were still more casualties in the Australian forces due to illness than to combat injuries.¹

COMMENTS ON THE SYRIAN CAMPAIGN

Even a superficial study of operations in Syria impresses one with the constant change and movement which went on. The slenderness of the forces involved precluded any but modest reserves, and changes in plan necessitated by firm resistance demanded also a switching of troops and commands. Though the change over to corps control during the campaign had its difficulties it unified the organisation. This was particularly helpful to the Australian medical services, especially when their forward units were concentrated behind the line of the last decisive battle. This unity was more readily possible after Damascus fell, when a different plan of medical evacuation of that sector was adopted.

Field Ambulances. Norris in a brief memorandum on 1st July pointed out that during operations the function of a field ambulance is to supplement the service which secures without delay for the casualty the treatment designed to bring about his recovery. This principle was to be strictly observed lest the rapid clearance of forward areas should be hampered. His plan of assigning a different role to each of the two field ambulances whereby one handled the major casualties requiring immediate surgical treatment and the other less seriously wounded worked well. Until the battle of Damour it was possible to transport casualties from the R.A.Ps. by ambulance cars. At first M.D.Ss. were not used as a necessary link in the chain, and until A.D.Ss. were distant more than a three hour journey from the C.C.S. evacuation was made direct by the M.A.C.

Though two surgical teams arrived at Haifa on 17th June, there was no immediate need for their services in forward areas. Indeed one team remained at Haifa throughout and rendered good service there with the 168th British Field Ambulance which was performing under difficulties the duties of a clearing station. The other team worked forward for only two weeks, but with the longer line of evacuation it was much needed there and fulfilled its purpose. The question of the constitution and status of a surgical team was again raised. Major Wyndham in his report took the view that such a team should be an independent unit with its own transport. Mobile dressing stations were fitted up by both field ambulances and proved very satisfactory under the existing conditions.

The brief trial of mule transport was not encouraging. Later, however, Major Humphery in Tripoli experimented further with mules, and extemporised with gear for carrying sick. This was not tried in action, but in rugged country there still seems to be a place for surefooted animals, perhaps donkeys as suggested by Norris.

With the rapid changes and recrystallisations of military formations the necessity for elasticity in medical planning was evident. Colonel Norris,

¹ Australian battle casualties in the Syrian campaign were as follows: Killed in action 327, died of wounds 89, wounded in action 1,136. Total 1,552.

the A.D.M.S., suited his resources to the task, which was made easier by the existence of good transport by road and rail. The accidents with infected blood have already been mentioned and dealt with elsewhere. Full value was extracted from this experience in exacting the most rigid care in all routines of blood collection and administration.

Ambulance Trains. The service available on the Palestine railway was very satisfactory. The arrangements on the eastern sector were not so smooth at first, but when equipment was fully provided and a special train medical staff appointed, consisting of one medical officer and six other ranks, the results were much better. The method by which patients were taken to Amman by train and thence by ambulance car to British hospitals in Jerusalem had to be modified, as the Arabs along the road from Amman to Jerusalem indulged in sniping at traffic. Affuleh was found to be a better terminal than Amman.

Rest Stations. Early in the campaign Colonel Johnston was desirous of having a field ambulance under corps control, particularly to undertake the running of a rest station. The need for this was also stressed by Norris and later by Smyth of the 6th British Division. Had the campaign lasted longer the beneficial effect of this unit's work would have been even more evident. The moral effect on men, especially those with exhaustion states, was much better when they were sent to a neighbouring unit to rest, rather than being passed by stages to a hospital from which they made a slower return. The advantages of the units being able to have men treated for minor complaints and not to lose them on the "X list" need no stressing, especially as the station could hold up to 650 men when fully established.

The Hospitals. It was not long before the strain of this campaign, brief though strenuous, was evident in the 2/1st A.G.H. at Gaza, and the 2/7th A.G.H. at Kafr Balu. The 2/1st A.G.H. originally of 600 beds had doubled its size, but at the height of the last actions in Syria increased the beds officially to 1,500, temporarily with the verbal permission of General Burston, D.M.S. to 1,800 and unofficially perforce to 2,000. The 2/7th A.G.H. had been establishing itself in the site left by the 2/5th A.G.H. when this unit went to Greece, and was still in a somewhat inchoate condition when the campaign began. This hospital therefore had to receive constant additions from convoys every second night while engaged in establishing itself. Thus the demands of Syria on these hospitals were considerable. It must not be forgotten, too, that the staffs of hospitals do not rise proportionately with admissions, and even a rapid turnover between a hospital and a convalescent depot demands a great amount of administrative work, let alone the technical labours of the medical staff.

Supplies. Medical supplies gave occasional anxieties, principally owing to uneasiness about malaria and the special provisions for its prevention. There were also difficulties due to the lack of an advanced depot medical stores nearer than central Palestine. Units sometimes caused confusion by sending vehicles direct to the stores with an immediate demand.

Disease. The endemic diseases of Syria became more apparent later when the army of attack became an army of occupation. They were well-known though their incidence could only be guessed in most instances. Relapsing fever came to be of much greater importance than hitherto, and comparatively early in the campaign the problem of distinguishing this disease from other acute fevers became one of importance. The dysenteric diseases were already well known, but there was to be an aftermath of amoebiasis. Malaria was the dominating medical factor. As already pointed out, the medical aspects of the projected campaign were not considered seriously during the early stages of planning, and though the experts of the highest calibre were of great assistance later, the most essential links of the chain were defective. These were the unfailing provision to the troops of the necessary wherewithal for protection, and its unfailing use by them. This last is a responsibility of the unit, which alone can enforce its own discipline. Sometimes material was available, and not faithfully used. Sometimes the commanders wished to enforce its use but had no material. Captain Croll from experience with the 2/2nd Hygiene Section estimated that during the campaign it was practicable for at least half the force to use nets. The 25th Australian Infantry Brigade was exposed to risk of infection at Merdjayoun, and the fruits of this exposure were evident later after the fighting was over when 300 men contracted malaria. One non-Australian unit spent two nights in a danger zone without precautions and in three weeks lost 80 per cent of its strength from malaria. Notwithstanding these defections, the cooperation of the malariologists and hygiene officers did much to inculcate a protective discipline which at least reduced the incidence of the disease to a relatively low level up to the time of cessation of fire. Nevertheless the statement may be repeated that it was fortunate that the campaign did not drag on into the height of the season for malignant malaria. There is no doubt that a definite degree of success attended anti-malarial work during June and July in Syria; it was during the later periods that the full significance of the sins of omission were realised.

The campaign in Syria was the first trial of strength of the Australian forces against malaria. Without anticipating, it may be said that the troubles were only beginning, and that the true incidence of malaria in this country was only manifest at a much later period when recurrences began to appear.

Gas Gangrene. The occurrence of gas gangrene in wounds received in action emphasised the intrinsic risk in intensively cultivated country, and also the necessity for prompt treatment. This treatment was sometimes perforce delayed, not through breakdown in transport but through the initial difficulty of reaching wounded men. Once they had been brought in where resuscitation could be promptly applied, using infusions of fresh whole blood, and adequate excision of the wounds practised, the outlook was favourable. The results of the work of the surgical teams were very good.

Treatment of compound fractures. Apart from shock, loss of blood and risk of infection the problem of immobilisation of the lower limb in particular was difficult. The conditions in forward aid posts were not conducive to detailed surgical routines. Men reached the C.C.S. at Nazareth with extemporised splints which could not maintain immobility of the limb. A rifle was sometimes used to secure the limb. Admittedly a Thomas splint is much better, but the conditions were not always favourable for carrying out the procedure of applying it. As has been pointed out previously, it would be difficult to apply a Thomas splint properly in a stony wadi without light. The advice of Colonel Hailes, the Consulting Surgeon, established a principle, that it was better for a surgeon to aim at immobilisation when the patient had a journey before him than to be concerned with details of alignment. After the campaign was over a useful discussion was held at a clinical meeting at the 2/4th Field Ambulance, when the viewpoints of the R.M.O., the ambulance and C.C.S. officers and the surgical consultant were expressed. Hailes stated that in advance of the R.A.P. enough traction could be used to bring the boot heels level, the boots bound together and rigidity obtained by using a rifle on the uninjured side. At the R.A.P. application of a Thomas splint was desirable, avoiding a clove hitch round the boot or employing it only for a short time when it could be replaced by strapping or wire at an operating centre. In the field rapid evacuation and immobilisation were the necessities, so that resuscitation and further measures might be applied at a dressing station as soon as possible.

This campaign, though lasting only five weeks, was packed with medical problems, both administrative and professional, chiefly related to the practical application of technical knowledge. Before the Australian forces now stretched a period of occupation, an immediate future of conjecture, but full of thought and work for the medical services.

CHAPTER 15

ORGANISATION AND EQUIPMENT, 1941

IN November 1940 the 7th Division of the A.I.F. arrived in the Middle East, and when early in 1941 the 9th Division also arrived the I Australian Corps was complete, with regard to equipment and stores. With the passing of 1940 an era of operational activity began for the A.I.F. and as the troops campaigned over widely dispersed areas so the base organisation expanded.

ORGANISATION

In November 1940 General Blamey appointed Major-General Burston as D.M.S., A.I.F. The formation of a headquarters of the A.I.F. overseas with a rear echelon in Australia gave rise to some complications in the medical services, but discussion of Australian affairs may be best deferred at present. As previously mentioned Colonel W. W. S. Johnston was appointed as D.D.M.S. of the I Australian Corps, with Major W. P. MacCallum as D.A.D.M.S. and Colonel J. Steigrad as A.D.M.S. of Base Area and Line of Communications, with Major C. R. Blomfield as D.A.D.M.S.

The expansion of the A.I.F. organisation also called for additional staff officers; Lieut-Colonel K. W. Starr was appointed as A.D.M.S., followed later by Lieut-Colonel A. L. Dawkins, and Major H. M. Trethowan, followed later by Major R. H. Macdonald became D.A.D.M.S. Attached to the headquarters were the Consultants in Medicine and Surgery, Colonels Fairley and Hailes, the D.M.S. Dental, Colonel J. E. Down, and the Matron-in-Chief, Miss G. M. Wilson, later Miss A. M. Sage. Major W. Masters was the staff officer for the pharmaceutical service. The need for advisers in the various technical branches of medicine was supplied by the appointment of the following: Colonel J. K. Adey (psychiatry), Major G. Kaye (anaesthesia), Colonel J. C. Belisario (dermatology), Major C. Morlet (ophthalmology), Major E. V. Keogh (pathology) and Lieut-Colonel H. C. Nott (radiology). These appointments did not interfere with the routine activities of the officers concerned. Only one, Colonel Adey, was full-time officer at the headquarters, and he combined his duties as an adviser on psychiatry with those of the "A" staff officer, in which capacity he dealt with personnel and reviewed medical boards. Not all these advisers were appointed at the same time, but during 1941 their services were utilised as occasion arose.

Three divisions and troops in base areas required service, and as the average strength of the A.I.F. during 1941 was 76,440, administration claimed an increasing number of medical officers. Members of the medical services in the Middle East became more interested in the question of seniority. It was inevitable that there should be many inconsistencies but quite apart from these, the principles underlying promotion in the A.A.M.C. were not well understood by medical officers. Inequalities existed

from the beginning, the reasons for which were often obscure to those bearers of temporary rank who are not familiar with procedure. It was obvious that certain specialists, even though highly trained, were in dead-end positions from which there was no promotion except through the channel of administration. On the other hand medical officers who followed a successful administrative career often regretted the loss to their craft and their knowledge. In this they were no different to many others who made the inescapable sacrifice, usually, though not always, entailed by military service. It is necessary for once to anticipate and point out that the war had been in progress three and a half years before the policy in regard to promotion within the A.A.M.C. was made clear in an administrative instruction (No. 39). Only appointments of officers commanding camp hospitals and staff appointments were made purely by selection. Promotion from captain to major in field units was made according to corps seniority, having regard to experience, age and physical fitness. All other appointments and promotions were made by selection, but, other factors being equal, corps seniority was the deciding factor. A difficulty occasionally arose when an officer arrived in the Middle East bearing the appropriate rank for a particular task, while another officer with service and relevant experience behind him was ready for promotion. Closer consultation between Australia and the overseas force was obviously desirable, and its necessity was stressed from the A.I.F. headquarters.

HOSPITAL ACCOMMODATION

In July 1940 it was found that regular transport of invalids from the Middle East to Australia was uncertain, and the policy was adopted of maintaining hospital accommodation up to 8 per cent of the force. During 1941 losses of equipment in Greece and the heavy demands on the established general hospitals made it difficult to maintain this figure. In September 1941 the position was as follows, after the 2/1st A.G.H. had been expanded from 600 to 1,200 beds:

Hospital	Beds on establishment	Beds late 1941
2/1st A.G.H. . . .	1,200	1,500
2/2nd A.G.H. . . .	1,200	1,200
2/3rd A.G.H. . . .	—	—
2/4th A.G.H. . . .	600	600
2/5th A.G.H. . . .	1,200	1,200
2/6th A.G.H. . . .	600	600
2/7th A.G.H. . . .	1,200	1,500
2/9th A.G.H. . . .	600	600
2/11th A.G.H. . . .	200	200
8th A.S.H. . . .	400	400

The 2/3rd A.G.H. existed only on paper, but Burstons sought authority to mobilise its dispersed staff and use its equipment to furnish additional space. He also proposed to expand the 2/5th A.G.H. to 1,500 beds. He estimated that with normal evacuation rates overseas and reinforcements

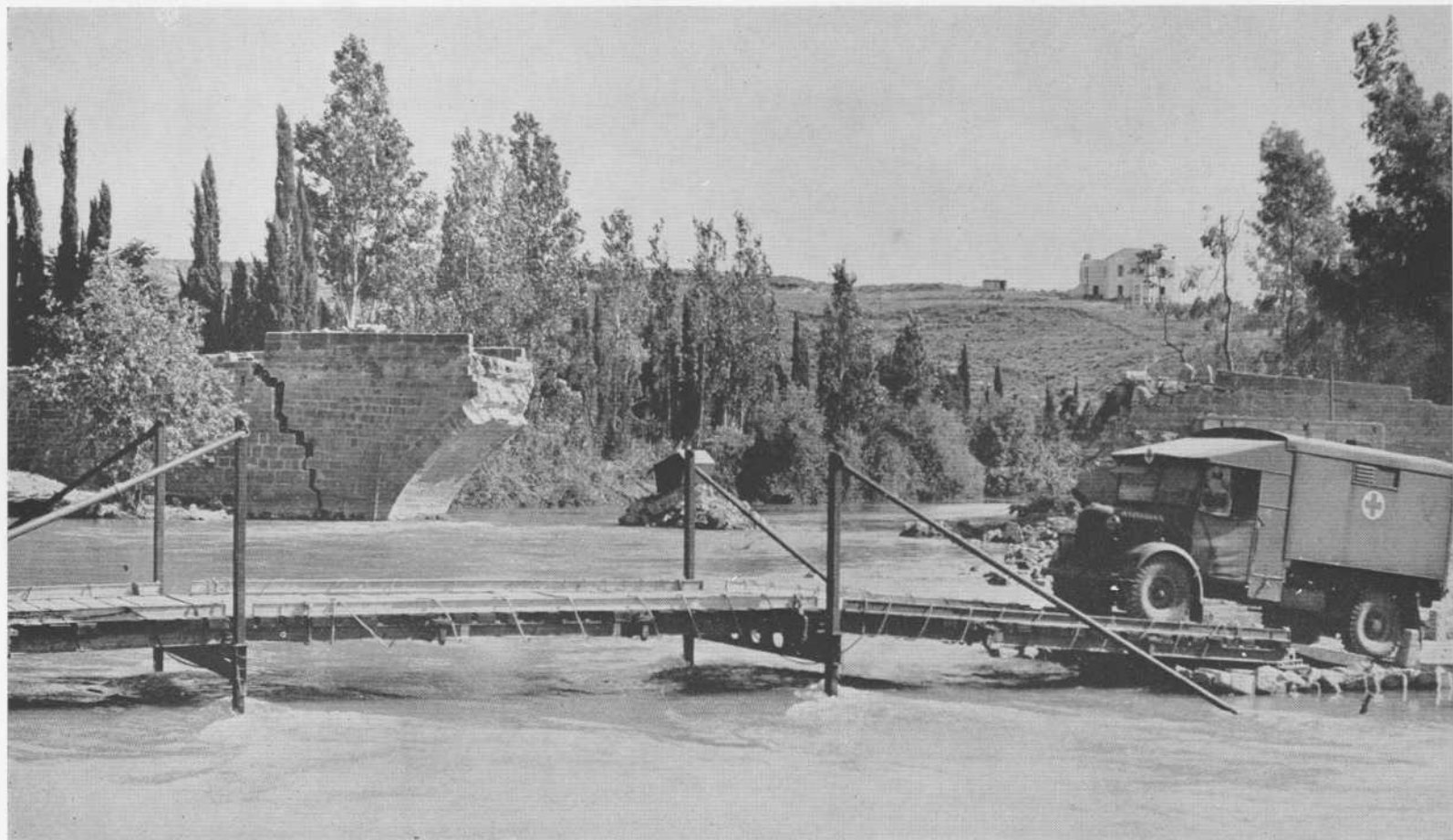
at the rate of 8,000 per month there would be a deficiency of 700 beds in the Middle East. The 2/11th A.G.H. was specially set up in Alexandria to cope with sick and wounded returning by sea from the Western Desert and from Greece. This hospital worked at high pressure until the altered military situation caused its withdrawal to Palestine at the end of 1941.

The pressure of the 1941 campaigns on base medical units was borne chiefly by the 2/1st, 2/2nd and 2/7th General Hospitals. Most of the battle casualties reaching Australian hospitals from the desert were taken by the 2/2nd A.G.H. During the Syrian campaign the casualties reaching the base area were admitted to the 2/1st and 2/7th A.G.Hs. Owing to the short line of evacuation and the comparative ease in bringing patients from the casualty clearing stations back to Palestine, the numbers reaching these hospitals quickly attained a high peak. The 2/1st A.G.H. for a short time had over 1,800 patients, mostly with medical disabilities, and had 2,000 beds equipped. The 2/7th A.G.H. occupying the site vacated by the 2/5th A.G.H. at Kafr Balu when this unit left for Greece, was barely able to open and equip enough beds to keep pace with the demand.

The 2/2nd A.G.H. received most of the casualties from the Western Desert, and here, at Kantara, were the facio-maxillary and plastic unit and an orthopaedic centre. This orthopaedic centre was not easy to organise at first without cutting off too many general surgical beds, and it was not practicable as first suggested to send patients from other centres, even though complete and satisfactory treatment could be obtained there, as this tended to slow the turnover of orthopaedic beds, never at any time very fast.

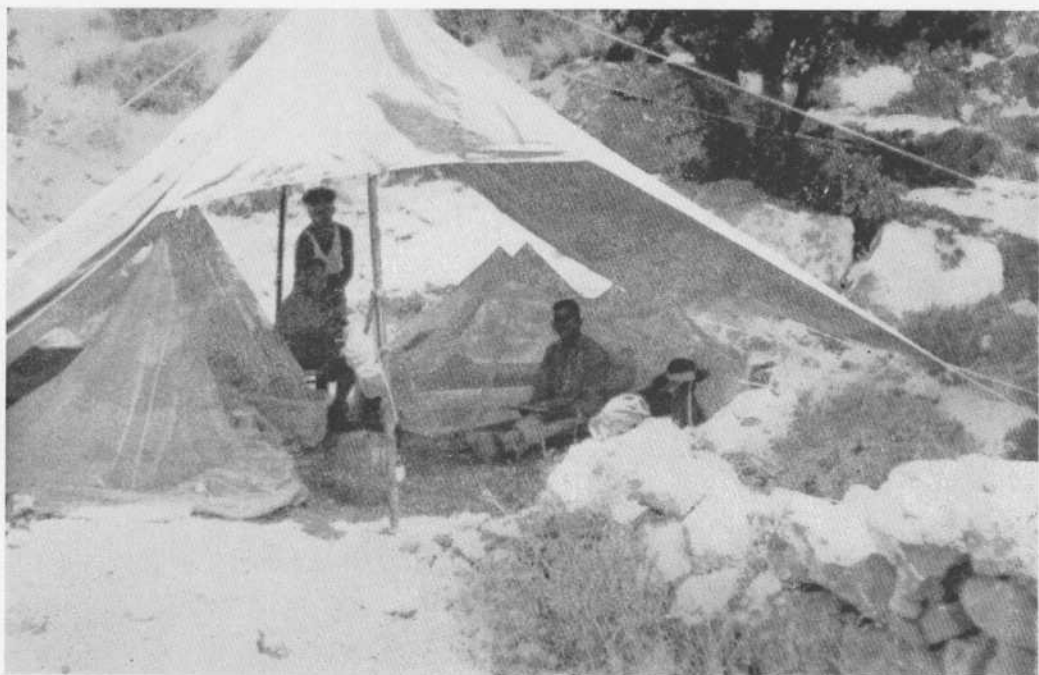
The 2/5th and 2/6th Hospitals, after losing their equipment in Greece, had a period of inaction, during which their medical staffs were detached for duties with other medical units or for medical boards. The nursing staffs were concentrated in the Gaza Ridge area for some time; many nurses were attached to other hospitals for duty, and their help was very opportune. It may be noted here that the establishments of nurses for medical units were found to be inadequate under existing conditions. A 1,200 bed hospital was originally entitled to 80 nurses and a 600 bed hospital to 50, but later amended establishments raised the numbers to 120 and 75 respectively. With the nurses from the 2/5th and 2/6th Hospitals added to those already working in the area the total of women concentrated at Gaza Ridge was considerable. At this time air attack by the Germans was thought to be likely and the problems of air defence were not negligible, especially as practically all available labour was absorbed in hospital extension and little was available for the preparation of shelters or slit trenches. Fortunately all remained peaceful at Gaza Ridge.

Two of the A.I.F. hospitals had their destinies affected by strategic considerations. The 2/9th A.G.H. on its arrival in Egypt in March 1941 camped at Amiriya and shortly moved to Abd el Kader, where the hospital site in a sandy desert, close to an Arab village made little appeal to the staff. The extreme heat and the prevalent dust storms did not encourage



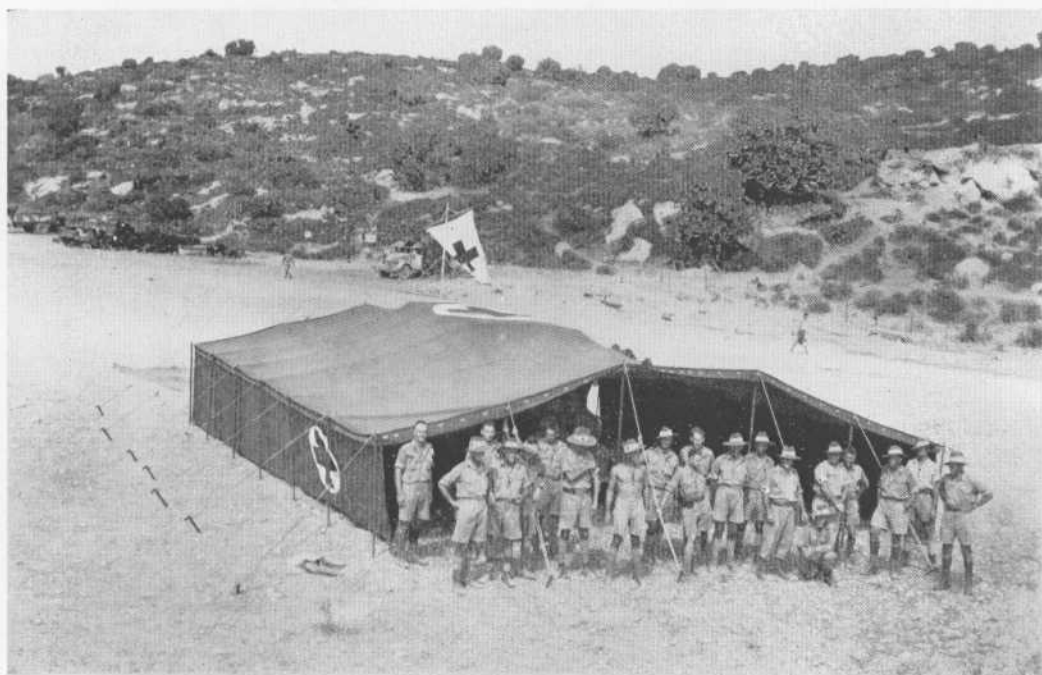
Crossing the Litani River, Syria.

(Australian War Memorial)



(2/4th Field Ambulance War Diary)

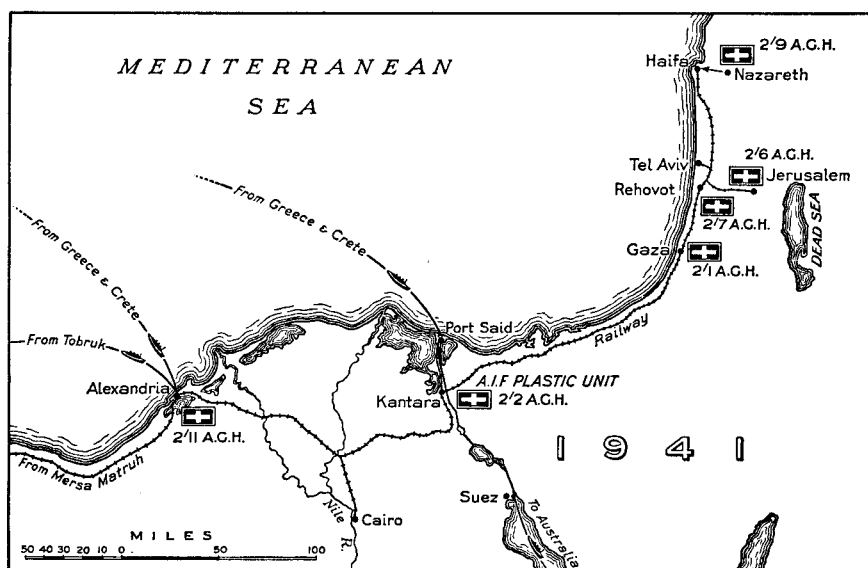
A 2/4th Field Ambulance tented ward near Qasmiye, Syria.



(G. B. G. Maitland)

Mobile dressing station constructed on 3-ton truck north of Litani River by 2/6th Field Ambulance M.D.S.

surgery, though the consultant surgeon thought the site was as good as most desert hospital sites in Egypt. As the unit was on the Order of Battle for Greece it was withdrawn, and a British hospital took over the site, but the collapse of the Grecian campaign altered the destination of the 2/9th A.G.H. to Nazareth in August 1941. Though housed in buildings in Nazareth the hospital staff found these very inconvenient, and the D.D.M.S. of Palestine Force considered that the site was more suitable for a C.C.S. and not adapted for a hospital. This illustrates the fallacy of assuming that existing buildings are necessarily suitable for a hospital, often exemplified during the war years. At the end of 1941 the 2/9th A.G.H. joined the "Stepsister" move which determined the movement of the greater part of the Australian forces from the Middle East.



Hospitals, Middle East.

The 2/5th A.G.H. after re-equipment was assigned a role which was at the time part of a strategic plan. The tenure of northern Syria and Palestine seemed to be precarious after the middle of 1941, as a German attack appeared probable. It therefore appeared necessary to have hospitals sited away from Palestine and the Canal zone, and to have accommodation provided nearer Australia. The 2/12th A.G.H. was sent to Colombo, and arrived there in October 1941. The 2/5th A.G.H. was established at Gura, near Asmara in Eritrea, and arrived there on 12th September 1941 with a modified staff. It was thought that a hospital here, in an elevated healthy climate, and in a safe area, would be useful for the care of patients with fairly long term illnesses, such as orthopaedic disabilities. Only limited numbers of patients were admitted, and as the site was in demand by others the patients and later the members of the unit were returned to

the 2/2nd A.G.H. While in Eritrea one officer, Captain E. H. Goulston served temporarily with Shepherd's force in the Gondar area. At the end of 1941 the 2/5th A.G.H. joined the other formations of the A.I.F. which were being assembled for the "Stepsister" movement. The 2/6th A.G.H. after re-equipment took over a building in Jerusalem from the British and worked there until the departure of the 2/1st A.G.H. at the end of the year, when the unit took over the 2/1st hospital site, and with the 2/7th A.G.H. provided Australian base hospital accommodation after the other Australian units had left the Middle East for duty elsewhere.

It will be observed that even while hospitals were doing comparatively little work as collected units in Palestine there was little Australian hospital activity in Egypt. Even the 2/2nd A.G.H. though in the Canal zone, was not in Egypt, being on the eastern side of the Canal. Actually it was impossible to house all Australian sick in Australian hospitals in Egypt. Scarcity of materials and difficulties in obtaining buildings on suitable sites made it impracticable to give effect to this general policy. Early in 1941 this was particularly noticeable, and many Australians were looked after in British and New Zealand hospitals in Alexandria and Cairo. During 1941 a site at Buseili in the delta area and another in the Canal zone were suggested as suitable for Australian hospitals, and a proportion of Nissen huts was allocated to replace tents for this purpose, but circumstances did not permit the realisation of these plans.

This brief account does not do justice to the great bulk of excellent work done by the Australian hospitals in the Middle East. Some were rooted to one spot over long periods, such as the 2/1st A.G.H., and to a less extent the 2/2nd and 2/7th A.G.Hs. Others had their share of movement, and of hazard demanding no small degree of fortitude. The 2/4th A.G.H. had an extraordinarily varied career and took all opportunities of producing work of high standard under difficult conditions. The 2/5th A.G.H. and the 2/9th A.G.H. suffered frustration and were never able to extend their full force, and the 2/3rd A.G.H., achieving unity after a difficult extemporisation in England lost and never regained its individuality. However in no instance was the resultant wastage as great as might appear, for the first-rate staffs of these hospitals did much to initiate and sustain a technical standard which was really that of a teaching hospital, and helped to maintain a freshness and keenness in clinical and medical scientific work. The development of specialist services was noteworthy during 1940 and 1941. Geographical and military considerations did not always permit so full an exploitation of these in all areas as the specialists themselves would have desired, but much good work was done without the facilities of fully equipped clinics.

TRAINING

During 1941 circumstances altered in the Middle East in several ways affecting the need and type of training. With the greatly increased number of troops reinforcements presented a big problem in training, as it was evident that the most valuable part of it was that carried out in the coun-

tries and areas where the lessons were to be applied. Certain particular problems became more pressing, such as the dangerous though partly preventable sick wastage which might result from such diseases as malaria and dysentery; the necessity for medical units usually provided with nurses to be able under necessity to work without them, and the greater versatility demanded of men in field ambulances when sub-divided into small self-contained sections.

As the Reinforcement Depot became larger and more important the medical side of the training carried out there required a different organisation. At first A.A.M.C. personnel formed a company in a Services Training Battalion, but this was not satisfactory, and in May 1941 the A.A.M.C. Training Wing was formed and located in a logical place near the 2/1st Australian General Hospital, first at Gaza Ridge and later in a better area at Kilo 89. The functions of this unit were laid down as follows:

1. The reception, training and preparation for onward despatch of all A.A.M.C. reinforcements, together with any necessary equipping, medical examination etc.

2. The reception, refresher training and preparation for onward despatch of all "X list" A.A.M.C. personnel together with any necessary equipping, or medical examination.

3. Special schools and courses. Personnel attending these were, according to the nature of the instruction, to be drawn from A.A.M.C. Training Wing, other areas and services in the Reinforcement Depot, or other units in I Australian Corps.

Lieut-Colonel W. P. MacCallum was placed in command of the training wing, and worked there for six months. During this time the wing was placed on a sound basis of organisation and trained numbers of officers and men. The numbers held were never below 300, and often rose to 800. The training wing was organised on a three company basis, comprising H.Q. Company (including a hygiene cadre), "A" and "B" Companies commanded by medical officers each with a lieutenant instructor, and sub-divided into platoons and sections with instructor N.C.Os. All reinforcements went to "A" and "B" Companies and all "X list" personnel and those attached for special courses were attached to H.Q. Company. Difficulty was found in obtaining enough medical officers to assist in administration and training, owing to the prevalent shortage of general duty officers. The need at this period in the Middle East was not medical officers with special qualifications, but those adapted for general duties in the field. At first three lieutenant dispensers and a sergeant dispenser were used in the training, but this anomaly in War Establishment was overcome by the appointment of lieutenant instructors. These were changed over from time to time, instructors being detached from active formations for a tour of duty in the training wing. This obviously desirable arrangement was not greeted with enthusiasm at first, but the reluctance of active formations to part with officers for short periods was overcome when the advantage was realised. Training was organised on the basis of separate syllabuses for the different types trained, the minimum period being four weeks which

was extended to six weeks if possible. Men on "X list" were given refresher training for one or two weeks. The reinforcements could be sub-divided into two main groups, men needed for field units, such as field ambulances and C.C.Ss., and those for base units, general hospitals and convalescent depots. A degree of overlapping was practised so that all men had some elements of common military training. Hygiene was strongly stressed throughout. Physical training was also made a feature, and a high standard of discipline was maintained. A test of adequacy was applied to the O.Rs. trained in the wing before they were drafted to units.

Special courses were given on subjects such as hygiene and water duties, malaria control, and chiropody, and training for N.C.Os. and instructors was also given. At first the technical equipment of the training wing was most meagre, but by ingenuity and enthusiasm adequate material was obtained for the carrying out of routine instruction. Four tutor sisters were appointed from the A.A.N.S. and four model wards were erected and fully equipped so that each sister could work independently with a group under training, and give instruction in nursing procedures. This teaching was pursued in the wards of the neighbouring hospital so that the men could obtain actual experience in the care of the sick. A model hygiene yard was constructed, and a museum was made complete with models and charts. Particular attention was given to improvisations. In this work the training wing was helped by the valuable work previously done by the staffs of field hygiene sections. Experience gained in a special temporary school set up for the training of nursing orderlies had also been of value, especially with regard to the organisation of the work of the tutor sisters.

An interesting matter concerns the type of men entering the wing for training. Such a wide disparity existed between the highest and lowest levels of the men attached for training that it was difficult to make the training appropriate for all. It was the experience of the staff that, despite the arrival of some highly trained and efficient men in the Middle East, the standard of training of A.A.M.C. personnel on arrival was very low. The fact that a man belonged to a medical unit was no guarantee of ability, aptitude or even interest. In many cases no attempt had apparently been made during the voyage to augment the training or even to discover the standard of knowledge of the men. The same applied to medical officers too in many cases, as numbers had left hurriedly without having time or opportunity for acquiring any military knowledge. This was accounted for by a certain lack of facilities for training, combined with the urgent need for reinforcements and uncertainties as to shipping. At first reinforcements arrived with their units already designated, but these arrangements frequently had to be altered, owing to the varying needs of the units. This was a very unsatisfactory or unpopular state of affairs. Later all reinforcements were allotted to a pool, and satisfactory local distribution was then possible.

In order to find out each man's capacity and degree of training a complete investigation was carried out on arrival. Each man's physical con-

dition was checked. As a rule this was satisfactory, but there were too many B class personnel in some drafts, who could only be used in certain units. Others again had disabilities which required re-assessment by a medical board, and sometimes even their return to Australia. A chiropodist examined each man's feet and supervised the fitting of correct boots. By interrogation particulars of previous service and training were discovered, and tests of knowledge applied by which men could be divided into several grades. It was not always possible to give each man the desired amount of instruction before drafting, owing to the calls for reinforcements, but the ideal aimed at was to send forward only men who had attained the first grade of training.

The question of age was found to be important. Of one batch of reinforcements arriving in September 1941, 48 out of 144 were over thirty-five years of age. This age is the upper limit for field work, though men aged up to forty can be drafted to hospital work, provided they are not B class, when only too often they do not prove to be of value for long.

The good work accomplished by the A.A.M.C. Training Wing was not only in the training of the men but its standardisation. Up to March 1941, as has been pointed out, there was a notable lack in any definite standard which might be expected of reinforcements, and such standard did not bear any strict relationship to the amount of their army experience. Teaching is essentially a matter of application of correct principles, organisation, and selection and supervision of instructional staff.

In May 1941 a special temporary school was set up under command of Lieut-Colonel A. S. Walker at Gaza Ridge for the intensive training of medical orderlies. It may seem curious that this organisation was kept distinct from the A.A.M.C. Training Wing, which was eminently suitable to undertake the work, but the reason was purely technical. It was held that the training wing in the Middle East was for reinforcements and "X list" and other special personnel only, whereas the orderlies' school was designed for those already attached to medical units but not engaged in active work at the moment. The loss of the entire equipment of the medical units with "Lustre" Force in Greece had reduced these units to temporary impotence. Their staffs were employed with other units as far as possible or in field training, but till re-equipment could be completed little could be done. It was obvious too how necessary it was for A.A.M.C. male personnel to be trained in nursing procedures, as the nurses in Greece had hardly been employed at all, owing to the military situation. Accordingly the plan was evolved to concentrate on the further training of the men of these units. The idea was excellent, even though the temporary establishment of an entirely separate unit for the purpose seemed unnecessary. Unfortunately a great deal of the value of this school was lost by insistence by the "G" Branch of Base Area H.Q. that all the unemployed O.Rs. of the units concerned should be included in the school, though the original plan was designed for selected orderlies only, some seventy to eighty in number. Instead, a much larger and remarkably incongruous collection of men was assembled, whose segregation into appropriate

classes might have been readily possible had sufficient instructional staff been available. Four tutor sisters were attached, and a fifth to coordinate ward work in the hospital with the needs of the students, and all necessary equipment was obtained. The course was laid down for two months, but at the end of a month, when all formal instruction was completed, a simple test was applied to all men held at the school and those eliminated who were not considered apt for further tuition. The remainder were attached for ward duties and other special work at the 2/1st Australian General Hospital for another month.

These experiences in training men for technical work in medical units were undoubtedly valuable in subsequent training undertaken on a larger scale in Australia. But in an overseas force in particular, compromise is inevitable, and the practical aim is then to produce the best that can be achieved in limited time and with limited staff and opportunities.

Higher technical training continued to maintain a high level. Even in Tobruk regular clinics were held in the 2/4th A.G.H. which proved most stimulating to the medical officers. When the 2/7th A.G.H. arrived in Palestine the O.C. surgical division, by direction of the D.M.S., visited the 2/2nd A.G.H. with two nurses for the purpose of studying some of the special methods in use there. The use of tutor sisters was extended to field ambulances and C.C.Ss. in training, thereby giving orderlies useful instruction in nursing procedures and the care and handling of instruments. It was of course recognised that training to be successful must be a continuous process, and that these courses can only be preliminaries. This point was emphasised by the experience of field units who found that orderlies trained in a wing or school may have made a good start, but needed a great deal more. The Matron-in-Chief pointed out too that the sisters working in the training wing received complaints from both medical officers and nurses in hospital wards that the trainees were deficient in knowledge of asepsis and nursing procedures. It was evident that more practical instruction was necessary. Medical officers also benefited from more military instruction and where possible the desirable practice was followed of placing newly arrived officers in a pool at the training wing, thence attaching them to a training unit as medical officer, and finally allotting them to their units.

A special query was raised in October 1941 concerning the possibility of training men as masseurs. Shortage of physiotherapists had been found for some time in Australia, and the suggestion was made that local training might help to solve this problem in some degree. However, Major Graham reported to General Burston that it was very doubtful if men so trained would be able to perform work of use to the army. Lack of educational background, and of facilities for the fundamental training in anatomy, physiology and pathology, together with limited clinical opportunities would make such training impossible of attainment. At the same time there did seem to be a limited field for some training in gymnastics and occupational therapy and in some of the applications of plaster technique

which would be of value, though the limitations of such training would be very considerable.

The staff of the Hadassah Hospital in Jerusalem continued to hold regular seminars for the benefit of military medical officers, and the resources of the laboratories were also used for the holding of technical courses in tropical diseases. Malaria in particular was the subject of many courses held at the Hadassah Hospital, at the Public Health Department in Jerusalem, at Moascar and elsewhere in the field.

Regular ward demonstrations were held in the general hospitals wherever possible. Some of these were organised to include all available medical officers in a formation, as when A.D.M.S. of the 7th Division arranged with the 2/1st A.G.H. for a series of such demonstrations to be given, and provided facilities for transport to officers rostered in succession.

EQUIPMENT

In 1941 the position in the Middle East with regard to medical stores was precarious and at times acute. Late in 1940, the Medical Supplies Branch of the Medical Directorate in the War Office sent out a memorandum requesting all medical and dental officers to exercise the strictest economy. Only a year after the beginning of the war army expenditure on medical equipment had reached the same level as at the peak of the 1914-1918 war, although at that time there had been no battle casualties in the Middle East, and the numbers of troops involved were smaller. As the Western Desert campaign proceeded the call for supplies increased. Australia sent medical units overseas fully equipped as far as possible, but there were deficiencies, such as generators and autoclaves, which were very difficult to obtain, owing to lack of copper and other essential materials. The surgical instruments industry was expanding in Australia, but all demands could not be supplied. Many drugs were scarce and all could not be obtained or made in Australia. Sedatives and narcotics were scarce, and as the need for these was rapidly increasing economy was necessary. Even means of heating in hospital wards, and kitchens constituted a problem; in Palestine the use of "Butagaz" an isobutane obtainable locally, solved this problem, though at a later date enemy action reduced the supply.

At A.I.F. headquarters the position was recognised as likely to become acute with the great expansion of the Australian forces and their certain involvement in campaigns in the Middle East. An arrangement had been made between Britain and Australia that army medical units sent overseas would be fully equipped on departure, and would thereafter be maintained in expendable stores from British sources. Financial adjustment would be made on a *per capita* basis. Some difficulty arose at times over differences between British and Australian equipment tables, but there were no serious obstacles. Delays in obtaining equipment in Australia were also to be reckoned with; some of these were unavoidable, but a not unimportant cause was the time lost in getting financial approval. Though medical units on the whole arrived well equipped there were deficiencies.

Thus the 2/5th A.G.H. lacked certain special surgical instruments on its arrival in the Middle East, and the 2/9th A.G.H. was unsatisfactorily equipped at first. Medical officers for reinforcements arrived without the equipment for an R.M.O., the scale for which had been altered, and the formation of additional units also called for more supplies. Camp reception stations needed equipment also, and before the arrival of an advanced depot of medical stores the supply of such material fell to the lot of the 2/1st A.G.H.

At A.I.F. headquarters certain danger signals concerning equipment were seen. Shortage of equipment still existed in medical units, further units were expected to arrive, and stocks of instruments were no longer obtainable locally: therefore the reserve stocks held by units were reduced from three months' supply to one. It was felt that Australia could supply most surgical instruments and appliances, and all rubber items, standard panniers, and agglutinating sera. Australian-made autoclaves and X-ray films and other X-ray material were very satisfactory. Certain items could not be made in Australia and would still have to be supplied from British sources.

On 13th November 1940 a conference was held between the medical directorates of the British Headquarters in the Middle East and the I Australian Corps, and at this the problem of medical supplies was frankly discussed in the light of information from the War Office and local knowledge. The War Office had notified British forces in the Middle East by cable that all possible sources of equipment must be exploited before home demands were made; this referred particularly to medical equipment, and recognised the probable increase of shipping difficulties West of Suez. This cable was repeated to Simla, but not to Australia.

At this conference it was pointed out by Major W. A. M. Scott, A.M.D. 3, G.H.Q. Middle East, that the position was serious with regard to several items, and only the minimum of help could be given to Australian units. Hence it was essential that all possible supplies, chiefly of non-expendables, should be derived from Australia. Medical maintenance reserves had not been provided by Australia, but any help would be welcome. One item causing embarrassment was nitrous oxide, as neither gas nor cylinders could be supplied, and a decanting unit from Australia was asked for. Naturally where Australia had produced its own types of equipment these would be maintained from this source.

Burston advised that a base depot medical stores should be established forthwith in Palestine, and that all efforts be made in Australia to maintain supplies not readily available from British sources. The quantities required for a base depot medical stores were reckoned on unit "A" supplying 50,000 men for three months, and unit "B" supplying 100,000 men for three months: forty-two "A" units and twenty-one "B" units were estimated to be required in 1941 and seventy "A" and thirty-five "B" in 1942. Burston submitted a report on the state of medical equipment and supplies in the Middle East, and on 25th November General Blamey forwarded this to Australia. This report indicated that



The 2/1st Casualty Clearing Station Beirut, Syria.



Motor ambulances in snow at M.D.S. 2/4th Field Ambulance, Italian Hospital, Tripoli, Syria.

(G. B. G. Maitland)



Field kitchen, El Alamein.

(W. G. Smith)

unless Australia could provide certain items there was likely to be a shortage in the A.I.F. and represented the urgent need of augmentation of maintenance supplies from Australia. Blamey pointed out that a question of major policy was here involved, concerning the British and Australian Governments, that of maintenance supplies being undertaken by Australia. He further stated that the position

appeared sufficiently serious to warrant urgent action to be taken to ascertain from England if the facts are as stated, and if so, to make the greatest possible contribution from Australian sources.

When this reached Australia the Minister for the Army (Mr P. C. Spender) regarded it as a most serious matter, and wished to be fully satisfied that no blame could be attached to Australia. On 14th December the British Commander-in-Chief in the Middle East cabled the War Office:

Understand from D.D.M.S. Australian Corps that medical stores can be available from Australia. Can you confirm? If correct, M.E. requirements might be obtained from there.

On 16th December the Australian Adjutant-General (Major-General V. P. H. Stantke) cabled the War Office from Melbourne as follows:

In consequence conference held 13th November between D.M.S. Middle East and D.D.M.S. Aust. Corps, G.O.C. Australian Corps much concerned regarding adequacy medical stores Middle East. Would appreciate your views regarding adequacy of equipment and whether you desire Australia furnish supplies which are limited without imports. We are prepared to assist to utmost on your demand.

On 16th December the Australian Adjutant-General (Major-General of the A.I.F. in London was asked to see the D.G.A.M.S. Lieut-General Sir W. P. MacArthur and was shown this cable. It was apparent that the D.G.A.M.S. was perturbed by this cable from Australia, as he had not had previous word from the Middle East of the conference, and he found it hard to understand the relationship of the A.I.F. to the Australian Army Headquarters. On 20th December the War Office replied to the Australian cable as follows:

Your cipher telegram December 16 not understood. Adequate reserves in Middle East for all forces including Australia. Your offer much appreciated but doubtful whether anything you can provide from local manufacture would materially affect situation. We would however be grateful if you could forward a list of such items of medical equipment as you can release for Middle East after you have set aside initial equipment to accompany future contingents. List should be restricted to items manufactured in Australia and should state estimated quantities per month. It is understood you are providing initial equipment on full scale for all units of Australian Imperial Forces. Adequate replenishments are being sent regularly from United Kingdom for whole of Middle East Force, but we gladly accept your offer to supply replenishments for use A.I.F. as regards those items which are produced in Australia. Please report any surplus thereafter of indigenous manufacture which you could readily release for general use of Middle East if required.

This was repeated to the Middle East. The Department of the Army in Melbourne on receiving the message notified General Stardee of its contents, as he was then *en route* to the Middle East, and suggested that

General Burston be asked to explain the situation. The cable from the War Office was sent by mutual agreement between General MacArthur and Colonel Anderson.

The rather tangled position was cleared somewhat by a letter to Lieut-Colonel Cameron, A.M.D. 3 in the War Office from Scott, which quoted Starr as stating that some Australian units had arrived short of some equipment, because of diversion of the original units, and that stores were available in Australia which would be useful in the Middle East. Major-General Tomlinson, D.M.S. in the Middle East, in a letter to the War Office stated that ample stores were held in the Middle East, and that the account already given of the conference was inaccurate, inasmuch as Burston's report was couched in stronger language than the occasion warranted. A demi-official letter was sent to Australia warning the D.G.M.S. not to take the report at face value, but the report arrived first. As a matter of fact it is evident on reading the demi-official correspondence from the A.I.F. Medical Headquarters in the Middle East that the D.M.S., A.I.F. and his staff were conscious that the necessary demands on their medical units imposed a considerable burden on the resources of the British force, in view of the responsibilities that it was bearing and was likely to bear in the future. This feeling was none the less real in spite of the accepted policy regarding the supply of medical equipment to Australian troops. This was stated clearly in a demi-official letter from the War Office, A.M.D. 3 dated 30th December 1940, as follows:

The following is the accepted policy regarding supply of medical equipment to Australian troops:

- (a) They are to arrive fully equipped.
- (b) We are to maintain them in all items which we supply to the British Army.
- (c) Australia is to provide, if they so desire, and consider it necessary for their troops, any items of medical equipment which are not standard for British troops.
- (d) There is no objection to Australia replenishing any or all items of equipment for Australian troops if they prefer to do so rather than draw from British stocks.
- (e) Any question of their supplying equipment of any kind for the British Army is a matter of policy to be decided between the two Governments concerned, i.e. between London and Melbourne.

A suggestion was further made that an arrangement should be made on the following lines:

- (a) Australia to continue to provide initial medical equipment for all Australian units, medical and non-medical.
- (b) Australia to provide replenishments for Australian units to the limit of their ability.
- (c) U.K. to supply the remainder provided the items are authorised for British troops.
- (d) In the event of Australia having a surplus of any item produced in that country from natural resources which U.K. find difficulty to supply, we will ask Australia for supplies of that item for the use of troops in the Middle East and we would notify you which items, if any, you can ask for.

Pending agreement on (d) you should ask Australia for nothing for British troops, but you should welcome and encourage any offer to Australian Head-

quarters in Middle East to provide replenishments for Australian Forces in the Middle East. This they can do by replenishing their advance depots or base depot, if they form one.

The reaction of the medical headquarters in Australia was defensive. A statement from the D.G.M.S. to the A.G. pointed out that all medical units had gone forward well equipped, and special items had been sent as replacements, two advanced depot stores had been sent, the second replacing the original which had been deviated to England. He thought that the November conference had been misleading to the A.I.F. Orders had been placed fully absorbing the funds available and estimates for the requirements of maintenance had been lodged. General Downes, however, complained of the complex procedure following in purchasing medical equipment, in which there were ten stages before orders could be issued to successful tenderers, consuming from twenty-two to sixty days, and he asked for the adoption of a simplified method which would save two to four weeks.

At the A.I.F. headquarters any suggestions of reflection on the efforts put forth in Australia were disclaimed. Burston, who had been appointed as D.M.S. of the A.I.F. in the Middle East since the discussion had arisen, made it clear in correspondence that he desired to strengthen the hand of the D.G.M.S. in Australia, and that he appreciated greatly the successful measures taken to equip medical units leaving Australia. This did not lessen the need for supply of items still required by medical units, nor the need for reserves in the Middle East. It is a fair statement that on the one hand the supplies position in the Middle East was not so favourable as it appeared to the War Office, distant and faced with colossal tasks of supply on several fronts, and on the other hand the medical needs of the A.I.F. in the Middle East were unduly underlined by the A.I.F. supplies officers who continually besieged their opposite numbers in Australia for further supplies of necessary equipment. It should be understood too that the delays encountered in Australia could not be avoided by the Medical Directorate, and the time elapsing between requests from Palestine and the receipt of desired supplies was considerable, even if reducible to some extent. It is easy to see that some inconsistency might appear between an instruction to cut down local reserves from three months' to one month's supply, and the proposal to establish a base depot of stores in Palestine.

In January 1941 Mr Spender and Lieut-General Sturdee, the Chief of General Staff visited the A.I.F. in the Middle East. Sturdee was able to confirm that the medical headquarters in the Middle East needed all that Australia could supply. On 14th February a cable was sent to the Prime Minister from the Middle East outlining the urgency of the supplies position, and recommending the delegation of the powers of the Contract Board to the Medical Equipment Control Committee in Australia. This caused no little irritation in some quarters, and repeated requests from the Middle East for equipment which had been requested in November

1940 did likewise, especially as the necessary funds were not approved until April 1941.

In March an agendum came before the War Cabinet dealing with the questions of policy in initial medical equipment, maintenance supplies and reserves for the A.I.F. In Egypt A.I.F. representatives discussed equipment problems with Mr Shedden, Secretary of the Department of Defence, while he was visiting the Middle East, in particular the gradual swing of the policy of the War Office towards the adoption of the principle of partial furnishing of maintenance supplies from Australia. He promised his support in using more extensively the coordinating function of the Medical Equipment Supply Committee. Capitation arrangements were also discussed in May by Lieut-Colonel K. W. Starr representing the D.M.S., A.I.F., Mr McGibbon and Mr Sheehan of the Treasury. Information was available at this conference concerning the building up of reserves of medical supplies; the cost for a twelve months' reserve in Australia and a five months' reserve in the Middle East was estimated at a million pounds. A vote had been obtained from the War Cabinet for a like sum for medical equipment of units. A telegram was received by the D.M.S. from the Department of Army as follows:

The Australian Government has made most generous provision for medical equipment required in Australia and abroad. Everyone happily satisfied.

By the end of June most of these troubles had been allayed, and a different aspect was placed on the whole supplies position by the dramatic events in the campaigns in the desert and in Greece and Crete. It seemed to the A.I.F. administrators as if their fears of further shortages in medical supplies had been prophetic, in view of the huge losses of both expendable and non-expendable supplies. These losses included the equipment of twenty-eight R.M.Os., two field hygiene sections, three field ambulances, headquarters and two sections of an M.A.C., two C.C.Ss., one 600 bed and one 1,200 bed general hospital.

This whole equipment episode was unfortunate as it caused some disturbance in medical headquarters in London, Middle East and Australia, though possibly it had some useful results. Without question there was misunderstanding on all sides, arising from the divergent views which are characteristic of widely sundered bodies engaged on different aspects of the same cause. That full credit was due to the Australian people at home for their efforts in equipping their oversea force is evident from letters from London and the Middle East. Lieut-Colonel R. D. Cameron wrote from the War Office:

Everybody here from the D.G. downwards is completely satisfied that Australia has always pulled her weight in all army medical matters and is still doing so. We here are all very grateful to you personally.

General Burston wrote to General Downes:

With the backing you are giving from Australia we are in a really very sound position, and I think it is safe to say that there has probably never been a force sent overseas from any country better equipped on the medical side.

Had closer personal liaison been adopted at an earlier stage much of this misunderstanding might have been avoided: actual contact of officers personally engaged in this work would have been much more valuable than contacts at a higher level. Before the repercussions of this incident had died away further signal changes in administration had been made. Downes had been appointed in Australia as D.M.S., A.I.F., but Burston had been appointed to this post by General Blamey in the Middle East; Downes was then appointed as Inspector-General of Medical Services and Major-General F. A. Maguire replaced him as D.G.M.S. on 27th March 1941.

PROBLEMS OF TRANS-SHIPMENT

Certain difficulties arose in connection with medical stores on transports, and with methods of packing of material. Major Christie was sent from Australia to investigate these problems, which had become accentuated by the use of larger ships as transports, necessitating trans-shipment, usually at Bombay. Stores sometimes disappeared, both at intermediate and terminal ports, and cases and their contents suffered considerable damage by multiple handlings. The medical stores placed on transports for use during the voyage were the subject of some argument, chiefly because their type and amount were not always adequate, but deficiencies were remedied. Donaldson and Christie obtained approval from the D.M.S. in Army Headquarters at Delhi for an increased scale of equipment on transports between India and the Middle East. Stores for use during the voyage suffered losses at Bombay, as did other stores for trans-shipment to the Middle East. Christie reported that there was a great muddle of stores in Bombay; everything came off the ships in lighters and had to be identified on the wharves by the units. Troops trans-shipping from a large ship were divided amongst several smaller ships and sub-division of equipment gave considerable trouble. Losses were not large but not negligible. Both in India and at Suez difficulty arose with the illiteracy of the labourers to whom labels meant nothing. Arrangements were made for stencils to be supplied by which instructions for careful handling could be branded on cases holding fragile equipment, but though these were printed in several languages, Urdu, Hindustani and Arabic, great improvements were not expected. At Suez losses were greater, probably owing to the smaller space available which meant greater confusion and more opportunity for incorrect diversion of packages. Equipment for the voyage suffered loss also, and material placed on transports in India did not return from Egypt. At the end of 1940 medical supplies became an urgent problem, and the proposal was made that the A.I.F. should retain residual supplies and use these to build up a base depot of medical stores which was being established. It was felt that these stores would make up for losses incurred through breakages and transfer from one transport to another during the journey from Australia. Methods of packing in Australia were often faulty, and these were not always of standard type. Wiring of cases was not always done, though laid down as necessary, as

the special machines for wiring were not always available when wanted. Some units found they had to buy paint and brushes to ensure that their stores were adequately labelled. Early in 1940 these faults were more prominent, but as experience grew and more reliable methods were standardised the position improved, though difficulties still existed, and loss and wastage still occurred.

Christie reported that there was great destruction of costly stores in Bombay; many articles were rendered useless, or the packages so damaged that the contents had little chance of surviving subsequent handling on wharves, and transit by train and lorry. No satisfactory answer could be found while multiple handling was inevitable. With regard to stores for use on the voyage it was recommended that clearer marking would help to secure the transfer of these essentials to other ships. It was obvious that there were difficulties in sub-dividing stores supplied for one large ship among several small ships. It may here be remarked that the very large ships did not make good transports in tropical zones; their virtue lay in the speed with which they could move large numbers. Christie was also commissioned to enquire into the medical care of Australians ill on arrival at intermediate ports. Patients were transported to military hospitals by the local British and Indian Army authorities in Bombay. As communication was difficult between ships and shore there was sometimes difficulty in finding to which hospital patients were moved whether Bombay, Deolali or Poona. When well, Australian sick were discharged to a transit or rest camp and held there until they could be embarked for Australia or the Middle East. Improvements were made in the records system, which had not been satisfactory; the medical liaison officer was then able to keep in touch with all Australians in hospitals or camps.

TRANSPORT OF SICK AND WOUNDED

During 1941 the methods of transport of sick and wounded were very diverse in different battle areas. Though suitable aircraft had arrived from Australia, there were delays in organisation, and in provision of arrangements for adequate servicing of planes and of spare parts. Therefore air transport had hardly begun in the A.I.F. in the Middle East up to this point. In the base areas rail and road transport were well organised, comfortable and reliable. In the various campaigns many difficulties had been encountered, chiefly related to the rough country covered, and the inadequate number of suitable vehicles available for service.

When the 9th Australian Division left Tobruk a share of the burden of evacuation of sick and wounded was lifted from Australian shoulders, but an arrangement was made whereby commissioned and non-commissioned officers and men were assigned to a pool supplying experienced help for use on sea ambulance transports. This work was distinctly hazardous, and some of the ships were added to the large numbers which were lost on the run between Alexandria and Tobruk. At the end of 1941 parties detached from Australian Army Medical Corps units were detailed for duty on several ships which were to pick up sick and wounded.

H.M.S. *Chakdina*, an armed merchantman was torpedoed, and the following night a sister ship H.M.S. *Chantala* struck a mine and sank in five minutes. By naval direction no stretcher patients were on the *Chantala*, but 70 wounded and 120 German and Italian prisoners of war lost their lives. Captain N. F. Laidlaw and a party of orderlies escaped in boats and lighters with such survivors and equipment as could be rescued, and later returned to Egypt in the hospital ship *Somersetshire*. S.S. *Shuntien* was also lost, being torpedoed on 7th December while returning from Tobruk. Only three of the A.A.M.C. party on board were rescued after two hours in the water, and Captain C. S. Donald and five orderlies were lost.

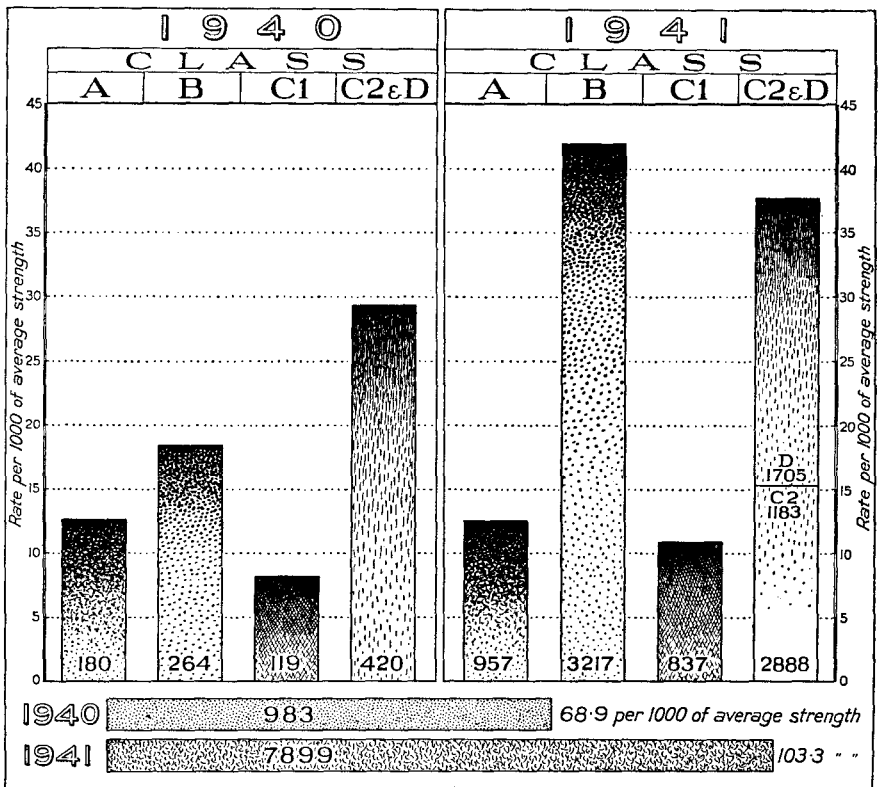
MEDICAL BOARDS

The work of medical boards deserves special mention. During 1941 the anomalies of recruit examination so evident in 1940 were less striking, but they were plain to be seen. Major-General Maguire in May 1941 soon after assuming office as D.G.M.S., pointed out that men broke down under training for well established reasons, and that the responsibility rested on the government, the recruit, and the medical officers, and could also be attributed to lack of proper camp training, faulty repatriation records and a margin of error. Attempts were made to remove minor disabilities by appropriate measures, particularly by special training of volunteers not quite attaining the desired physical standards, and this was successful in a fair proportion of cases. Maguire recommended strongly that only men in the highest category should be sent overseas, that false answers by the recruit should be followed by disciplinary action, and that suppression of essential information by an enlisting man should exclude him from pension and repatriation rights, but such action was never taken. He advised the appointment of permanent standing recruiting medical boards in each command.

Medical boards in Palestine were begun in connection with the 2/1st A.G.H. and were continued in the Gaza area by members of the staff of the 2/2nd A.G.H. and later of other hospitals. The convalescent depot and the base and reinforcement depots were also found to be very convenient for this purpose, and, as has been previously mentioned, a semi-permanent central board was appointed, consisting of Majors E. Hughes-Jones and J. H. Halliday. The fact that series of senior and experienced medical officers were available for this work accounted for the high standard which was attained, once the special knowledge needed for this duty was acquired. In spite of the continuous efforts of the medical boards it was difficult to keep down the numbers of men waiting for review. For example, during July 1941, nine different medical officers acted on the central board. A number of them suffered interruption of the work by sandfly fever, and at the end of the month though 618 soldiers had been reclassified, 494 still awaited boarding. It was inevitable that the standing medical boards should be appointed in each hospital, as the medical officers had special knowledge of the patients which was valuable in

assessment of their classification. This threw a considerable burden on the medical officers assigned to this duty in addition to their usual work.

In December 1941 the D.M.S. advised that a special establishment be adopted for a standing medical board as part of the Australian Depot Battalion, consisting of two lieut-colonels, two majors or captains, one staff sergeant, three clerks and four batmen. The changes in the military scene prevented further action in this direction. Earlier in the year however, members of a permanent medical board had been sent from Australia, and Lieut-Colonel C. K. Parkinson and Lieut-Colonel J. A. Gray, who pursued the policy already established, did much to coordinate this work in the Middle East.



Medical Boards, Middle East.

The numbers of men appearing before medical boards during 1940 and 1941 are shown in the graph. It will be noted that not only the numbers mounted steadily, but also the percentages of average strength; these rises were associated with the campaigns of 1941. In 1940, a total of 983 men, 68.9 per 1,000 average strength were submitted to medical boards for reclassification and in 1941, a total of 7,899 men, 103.3 per 1,000 average strength. The great rise in numbers of men recommended

to be sent back to Australia, will also be noted; 420 in 1940 and 2,888 in 1941. This category included the D group, those unfit for further service, and the C2 group, temporarily unfit but not likely to be fit within six months and therefore for return to Australia. One aspect of the work of the medical boards which was disturbing was the increasing number of B class men, who were only fit for work in base areas and who often had a disability which limited the type of work which they could perform. This difficulty, fully recognised during the 1914-1918 war persisted throughout the years and will be discussed again.

DENTAL SERVICES

Dental services worked under varied conditions in 1941. In the early part of the year the desert campaigns showed that only emergency work could be done while the troops were in the line. Some difference of opinion arose concerning the function of dental officers under such conditions. The A.D.M.S. of the 6th Division thought that during military operations they were most valuable as spare officers, and could act as anaesthetists, but the A.D.M.S. (Dental) considered that a separate dental corps should be established, and felt that his technical opinion would be of greater value if he had administrative authority and the right of direct approach to the general staff. At this time also difficulties still existed with dental supplies. An advanced depot of medical stores was equipped to handle these supplies, but improvements were made by the attachment of a sergeant with many years of special experience of dental stores and materials. The Australian method of sending dental teams forward as far as was practicable worked satisfactorily. Colonel Down considered that this plan worked better than sending prosthetic work back to a central laboratory as was done by the British dental service. When a British field ambulance handed over to an Australian ambulance at Homs in Syria some complications were caused by the fact that the dental equipment fell far short of the Australian scale. Dental trailers taken over from the Italians did not prove very satisfactory; only vehicles of very stout construction could survive the stresses to which they were exposed. Following a conference between General Blamey and Colonel Down an A.D.M.S. (Dental) was appointed to I Australian Corps, and one to the 1st Australian Base Area; the senior dental officer was appointed as A.D.M.S. (Dental) A.I.F., H.Q., M.E.

In Greece a good variety of dental work was carried out, and fortunately the necessarily heavy loss of dental equipment during the evacuation was offset by the resource of the dental officers, who carried out equipment at the cost of losing some of their own belongings. Most of the essentials were later replaced by local purchase.

In Tobruk there were several dental sections within the perimeter which rendered valuable service to the garrison. During the Syrian campaign dental treatment was given to British troops, and a British dental officer was posted to an Australian dental unit. Considerable illness was

experienced by dental officers during the occupation of Syria and caused some dislocation of work.

The bulk of work carried out in base areas did not grow less because of the poor dental state of reinforcements: it was suggested that from the point of view of administration it should be seldom necessary to send men away who were dentally unfit. In September 1941 arrangements were made for ordnance to supply tooth brushes to units on demand, on the basis of one for each soldier every two months.

VOLUNTARY AIDS

Some of the staff difficulties of hospitals were lessened by the arrival in the Middle East of Voluntary Aids from Australia. In July 1941 approval was given by the Military Board to employ female members of the Voluntary Aid Detachments in military hospitals overseas, on the basis of 63 for each hospital of 600 beds and 98 for each hospital of 1,200 beds. Two voluntary aids had already gone overseas on the strength of the 2/2nd A.G.H., but in special capacities only, one as secretary to the commander, and one as an assistant to the pathological laboratory. This was an irregular arrangement and not followed for any other hospital. Meanwhile, voluntary aids had been freely employed in military hospitals in Australia: many difficulties emerged which will be described elsewhere, but in March 1941 official sanction was given for the employment of voluntary aids on a paid basis. As early as January 1941 the desirability of sending female V.As. to hospitals overseas had been represented from Palestine by Blamey, acting on a recommendation by Burston. The first group arrived at the 2/12th A.G.H. in Ceylon early in October 1941, and the next draft arrived in Palestine on 28th November 1941 those allotted to the 2/1st A.G.H. beginning work there early in January 1942.

MEDICAL CONDITIONS DURING 1941

Little more is to be added to the observations already chronicled. The medical conditions in the Western Desert, Tobruk, Syria, Greece and Crete are described in the appropriate operational narratives.

In the base and training areas no new problems emerged. The chief medical preoccupations were with the culling of unfits from the force, the treatment of sick and wounded, and the prevention of seasonal and other infectious diseases. Improved techniques and unceasing propaganda kept hygiene in the forefront, but no relaxation was possible.

The figures for all infectious diseases in the A.I.F. in the Middle East for 1940 and 1941 showed certain differences, set out in the accompanying table. Sandfly fever attacked chiefly but not solely the non-immunes, recently arrived in the country; the figures still remained high. Enteric group fevers rose from a slight to a not negligible figure, owing to the antigenic limitations of the vaccine. Dysentery, because of the greater difficulties in maintaining hygiene under action conditions rose slightly. Malaria, though not occurring in base areas, began to show its dangers. Diphtheria, which caused some worry at the close of 1940, receded in

importance and needed no special steps. Venereal diseases, also a troublesome problem, caused a greater morbidity than the dysenteries. Hepatitis assumed serious proportions in some areas.

Diseases	1940		1941	
	Percentage of total infectious diseases	Rate per 1,000 average strength	Percentage of total infectious diseases	Rate per 1,000 average strength
Sandfly fever	29	80.3	25	74.8
Enteric	0.18	0.49	0.35	1.05
Dysentery (all types)	7.6	20.9	11.2	33.5
Malaria	3.34	9.19	10.4	30.5
Diphtheria	3.11	8.56	1.38	4.11
Venereal Diseases	12.8	35.21	16.25	48.46
Hepatitis	1.6	3.99	7	28.18
Mumps	10.54	28.96	10.43	31.1

Neuropsychiatric disorders, as described in the operational narratives, became an important cause of wastage, and required considerable organisation both in hospitals and convalescent depots for its treatment. The figures for 1940 and 1941 were as follows:

Psychoneurotic conditions		
	1940	1941
Number in hospital	308	2,678
Rate per 1,000 in hospital	0.022	0.034
Number returned to Australia	69	386
Rate per 1,000 returned to Australia	0.005	0.005

The vast majority of these were neuroses, and chiefly anxiety and exhaustion states, which with other non-psychotic states, numbered 2,326 out of 2,678. Hysteria accounted for 133 and congenital mental defects for 42. It should be noted that the figures for 1940 and 1941 are comparable when account is taken of the increased total strength of the A.I.F. Therefore the underlying basis of neuroses was present in the members of the force in 1940 although the exciting cause of combat was practically absent.

A.I.F. Pharmacopoeia

An important step was taken in January 1941 to regulate and conserve the use of drugs. The position was serious with regard to certain drugs, whose supply was limited by the conditions of war and difficulties of

manufacture and supply. All sedatives were scarce, and this shortage was felt when the numbers of psychiatric casualties began to grow. General Burston appointed an A.I.F. pharmacopoeia committee which, with Colonel Fairley as chairman was comprised of medical specialists and pharmacists representing various teaching medical schools in Australia, and included a representative of the D.M.S. of the British force. This body reviewed the position of supplies, and drew up a list of 174 essential drugs and preparations, marking some as only to be used with the sanction of a senior medical officer owing to limitations of supply. A formulary was drawn up including official preparations for use in all medical, surgical and special conditions. Placebos were banned, and efficiency and simplicity were aimed at in all formulae. Though a minimal formulary was also prepared in Australia, this pharmacopoeia and formulary was designed for use under the conditions peculiar to the Middle East. Its general educational effect was good, as it emphasised the need for realism and economy in military practice, and patients were not deprived of essential medicines.

THE CLOSE OF 1941 IN THE MIDDLE EAST

In 1941 the tempo of war was quickened, and its scope vastly increased. The Australian forces, were, as will be seen in the next chapter, concerned with hostile threats in the Western Desert, and in the north near the Turkish border. Each of these involved them in totally different experiences. But when in the last weeks of 1941 the third member of the Axis, Japan, shook the world with the surprise attacks on Pearl Harbour and Malaya and began a career of conquest in the East, it was evident that the Pacific zone was of the greatest importance to the United States of America, and also to Australia. With due secrecy the move known as "Stepsister" was prepared in which the 6th and 7th Australian Divisions embarked from the Middle East, leaving the 9th Division to complete an assignment in the desert. Whether the A.I.F. in the Middle East was to be employed in neighbouring zones, to journey farther from Australia, or to return for its defence was obscure to most of the participants of the move; but whatever the destiny of the force, and however it might divide or reunite, it had gained in this year 1941 a cohesion of administration, greater efficiency and endurance, and had ready to its hand a great bulk of material necessary not only for fighting but for healthy living and the relief of disability.

CHAPTER 16

OCCUPATION OF SYRIA

WHEN the brief but arduous campaign in Syria ended on 12th July 1941 the occupation force had many tasks ahead. The "convention" which settled the terms of surrender was concluded before any attack had been launched on the towns and larger settlements of this attractive country and most of the damage was not serious. There were several hazards of health facing the force, of which the most important was malaria. The most dangerous part of the malarial season was yet to come, as malignant tertian infections occurred most frequently during the later part of the summer and early autumn. Colonel Norris, A.D.M.S. of the 7th Australian Division, expected an increase of the numbers of sick; already the period of action had produced twice as many casualties due to sickness as those due to wounds. However the corps command took the matter seriously, and ordered that no sites for camps should be selected without the advice of a medical officer. The presence of experienced malariologists was of the highest value, and the surveys of native villages, and mosquito breeding places, and studies of types of mosquitoes enabled the hygiene staff to mark all areas with a clear indication of their safety or otherwise as camp sites. These preliminary precautions enabled the troops to settle into camps with lessened risk, though much anti-malarial work remained to be done. Before the medical problems of this period are considered it is necessary first to gain an idea of the military tasks likely to be required of an occupation force in Syria and the Lebanon.

As pointed out in Chapter 14, the necessity for the invasion and occupation of Syria lay in the evidences of German infiltration into the country, and the danger of German forces penetrating from the north. This danger appeared to be lessened by a number of factors in the situation, but it could not be disregarded. Though losses in Greece and Crete had been heavy, and the 6th Australian Division needed rest and refitting, the Germans had also suffered heavy losses in Crete, and their resources would be strained by Hitler's new Russian venture, which was begun on 22nd June. If, however, Russia gave way, the Persian oilfields might be endangered, or an advance through the Caucasus might cause a collapse of Turkey and the entry of enemy troops into Syria. These considerations were nebulous for the time being, but the occupation plan necessarily included preparations for a defence of the Tripoli fortress area. This comprised the Lebanon Range and the coastal plain north to the Turkish border, the area between Hama and the border, and the country between the Euphrates and the Mediterranean. The 7th Australian Division, under command of the I Australian Corps was assigned garrison duties in this area; for this there were available three brigades, the 17th, the 21st and the 25th and attached troops, in all numbering about 19,000. Corps headquarters was established at Aley, a hill resort some miles from Beirut.

MEDICAL ARRANGEMENTS OF THE 7TH DIVISION

The medical policy of the corps was influenced by the existing state of equipment and supplies, sadly depleted by the losses in Greece, and by the need for conservation of manpower in view of the widening commitments of the forces in the Middle East. There was a natural reluctance to place large immobile hospitals in areas which might not be secure, and it seemed better to expand hospitals in Palestine, and to use the existing resources in Syria as far as possible. For these reasons there was no intention of bringing an Australian general hospital up to Syria at this time, though every effort was to be made to retain sick within the corps area. These ends could be met by using the 2/1st and 2/3rd C.C.S. as holding units, virtually acting as hospitals, and expanding the M.D.Ss. of field ambulances to enable them to hold patients with relatively short-term illness in the brigade areas. The C.C.Ss. would then take patients from the field ambulances and hold them to the limits of their capabilities. There was, of course, a certain inescapable overflow of patients with severe or long-term maladies who could be sent down by road ambulance to the 2/1st and 2/7th A.G.H. in Palestine. As the Australian troops were still chiefly in the coastal sectors, their medical units centred mainly round Beirut and Tripoli; the 6th British Division and other British and Indian troops occupied the inland areas and used the 14th British C.C.S. or other holding units in the region of Damascus. The corps rest station re-opened at Ez Zib, took convalescents from the C.C.Ss. and field ambulances and returned them to reception camps.

Evacuation was mostly by road in the coastal sector carried out by the American voluntary field service motor ambulance convoy, which had sections staying with the Australian C.C.Ss.: one aircraft was available at Beirut; movement to Damascus was mainly by train. On 31st August 1941 Flight Lieutenant J. G. MacDonald flew up to Beirut from Gaza, shortly after the arrival of ambulance planes from Australia. Group Captain E. A. Daley, D.D.G.M.S., R.A.A.F., accompanied the flight of specially converted DH86 planes. Then Flight Lieutenant MacDonald took Colonel W. W. S. Johnston on a reconnaissance of airfields in Syria, and a plane also flew from Beirut to Cyprus taking Major Lorimer Dods to investigate an outbreak of poliomyelitis there and to bring patients back to Gaza. These ambulance planes later carried out service in the desert.

Soon after the armistice the 2/4th Australian Field Ambulance (Lieut-Colonel S. H. Lovell) moved into an Italian hospital in Tripoli, and worked with the headquarters and another company, the remainder of the ambulance serving several combatant units. A convalescent annexe was attached. The 2/6th Field Ambulance (Lieut-Colonel G. B. Gibb Maitland) worked temporarily in a site vacated by the light section of the 2/3rd C.C.S. at Ain Sofar near Beirut, and the 2/3rd C.C.S., moving up from Haifa, began work as a complete unit in school buildings in Beirut. Later the 2/6th Ambulance moved into a monastery at Achache. This was in a filthy condition, and was not convenient, as the evacuation

routes to the hospitals in Palestine were long. Urgent surgical and medical cases were sent to the 2/4th Field Ambulance: others were treated at the 2/6th Field Ambulance main dressing station.

The 2/1st C.C.S. had worked at Nazareth during the campaign; now, the main body of the unit, preceded by its light section, came up to Syria, and moved into a mental hospital at Asfurieh between Beirut and Aley. The two casualty clearing stations worked in unison; isolation cases were distributed between them, cases of dysentery were taken by the 2/1st C.C.S., and suspicious throat conditions by the 2/3rd C.C.S.

By August these arrangements were running satisfactorily; nurses were brought up to the C.C.Ss. as soon as conditions were settled, and were also used in the hospital run by the 2/4th Field Ambulance, and later in other similar hospitals staffed by field ambulances. Special clinics were also established. Major F. Scoles, ophthalmologist of the 2/9th A.G.H. opened an eye clinic in conjunction with the 2/3rd C.C.S., and Major N. W. Francis from the 8th A.S.H. at Gaza opened a clinic for venereal diseases. In the 7th Divisional area were also the 2/2nd Australian Field Hygiene Section, to which were attached two Australian anti-malarial control units, two Australian dental units and the 14th British Light Field Ambulance. During August also the 2/9th A.G.H. took over the buildings occupied by the 2/1st C.C.S. at Nazareth and provided hospital service closer to Syria.

On 7th August 1941, an episode occurred with some medical implications. Lieut-Colonel S. H. Lovell, commanding the 2/4th Field Ambulance, received a message from Brigadier S. G. Savage, commander of the Tripoli area, instructing him to go with the brigadier to the residence of General Dentz. Savage had presented an order from the force headquarters to Dentz requiring him to proceed at once with the area commander to the headquarters of the force commander in Jerusalem. It was understood that the Vichy Government had failed to observe an undertaking with regard to release and return of prisoners of war, hence General Dentz by reason of this order was virtually if not actually under arrest. Dentz submitted that he was unfit to travel, and at his residence Lovell consulted with the French Director of Medical Services for the Levant and the general's personal physician. The general had just recovered from a fever described as dengue fever, but more probably sandfly fever, and still complained of malaise. Lovell after examination of Dentz reported to Savage that, while the general would certainly feel mentally and physically fatigued, there was no reason why he should be considered unfit to travel. Though the French physicians tried to prevent the general from going to Jerusalem they gave no further opinion as to the degree of his illness or what harm he might suffer by this journey. Dentz travelled in his own car with his own physician, and arrangements were made for Colonel Johnston, D.D.M.S., 1 Australian Corps, to see him on arrival at Aley. After long discussion Dentz departed for Jerusalem as desired and arrived without harm or discomfort.

On 20th August Major-General R. M. Downes, Inspector-General of Medical Services, with Major C. H. Fitts, visited Syria in the course of a tour of inspection of the A.I.F. in the Middle East. He reviewed the work of the medical units and discussed matters of interest, especially transport and equipment for field units: other observations made during this visit are referred to elsewhere.

In September the remainder of the 7th Division arrived in Tripoli; the 18th Brigade with the 2/5th Field Ambulance (Lieut-Colonel A. H. Green) had been in Tobruk, and after resting in Palestine they joined the parent formation. The concentration and organisation of the Tripoli fortress area was begun, with some recasting of the medical services. By September the relief of the 9th Australian Division in Tobruk had begun, and by the end of October practically the whole of this formation had returned to Palestine for rest and reorganisation. The 6th Australian Division, restored and re-equipped after its losses in Greece, was ready for further service, and when the 6th British Division relieved the 9th Australian Division in Tobruk, the 6th Australian Division was able to take the place of the British formation in Syria. This exchange placed two Australian divisions under the command of the I Australian Corps, and concentrated the forces chiefly in the central and northern parts of Syria and the Lebanon. One effect of this was to widen the scope of the medical organisation, which embraced the country from the Turkish border southward. Though there was still no Australian general hospital in Syria, full medical and surgical services were available, with all facilities for laboratory investigations, pathological, bacteriological and biochemical, and radiological work. The attachment of the 2/1st Mobile Bacteriological Laboratory under Major E. Ford to the 2/3rd Casualty Clearing Station was a very satisfactory arrangement, and full advantage was taken of the close contacts of the laboratory service with clinical work.

ARRIVAL OF THE 6TH DIVISION

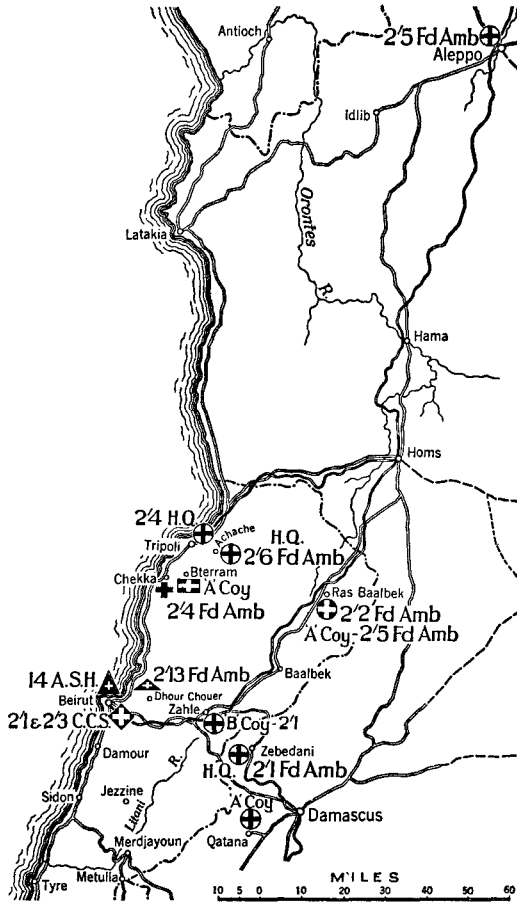
In October the medical units of the 6th Division began to arrive, and took over from British units. The 2/5th Australian Field Ambulance, which had been working in a school in Homs, running a hospital of 110 beds, handed over to the 2/2nd Australian Field Ambulance (Lieut-Colonel D. M. Salter), and moved on to Aleppo, there taking over a hospital from the 189th British Field Ambulance in buildings of an Italian school and hospital. Here this ambulance serviced the 18th Brigade, and sent patients on *via* Homs to Damascus. The 2/1st Field Ambulance (Lieut-Colonel R. H. Russell), relieving a British field ambulance, took patients at Zebedani, and had companies at Qatana and Zahle. Thus the two main evacuation routes were in use, the central route passing through Damascus, and the coastal road passing from Beirut to Haifa. The most difficult part of the task of the most northerly sited of medical units was the care of those troops controlling the frontier posts, which were widely scattered with poor means of communication. Each company had a medical orderly with the usual equipment of an aid post, and a medical

officer made a tour from one to another, taking about three days to complete the inspection of all the posts. The possibility of the introduction of exotic or epidemic disease across the border was borne in mind, for it was recognised that if any military action took place north of the Turkish border, refugees might constitute a real danger.

MEDICAL CONDITIONS

The diseases actually encountered during this phase of occupation will be described later: for the present it may be noted that malaria was assuming less importance, owing to the oncoming of autumn and the colder weather, and also to the improving organisation whereby the activities of the hygiene and malaria control units lessening risk of infection. Infective hepatitis was still a source of worry and during the months of September and October was increasing in incidence. Dysentery though usually mild in type, was still occurring and a few cases of typhoid were recognised.

During October the first patient with frost-bite was admitted to the 2/4th Field Ambulance at Tripoli. Working parties in the more mountainous areas were now feeling the effects of cold, and special care was necessary. Adequate supplies of warm clothing were obtained including balaclavas, thick socks and scarves, leather jerkins and gloves. Tinted goggles were needed for the glare from snow, and some emollient in a lanoline or greasy base was desirable to protect the face and hands. A few new cases of malaria



Occupation of Syria, October 1941.

were still seen in the coastal districts, usually related to the occupation of unsatisfactory sites, but the incidence was low enough to warrant the suspension of suppressive quinine. During October members of the nursing service from the 2/9th A.G.H. were attached to the 2/1st Field

Ambulance at Zebedani thus providing a full range of medical and nursing activities in all the larger centres. Many of the patients with hepatitis needed care for some time; they were admitted to the casualty clearing stations, and thence sent to the rest station to convalesce, unless it was thought advisable to send them on to a general hospital at an early stage.

At the end of September approval had been given for the formation of a 300 bed special hospital for the treatment of venereal diseases. Major N. W. Francis was promoted to lieutenant-colonel, and after gathering staff and equipment began work in the 14th Special Hospital at Bhamdoun on 3rd November.

During November there was some increase in sickness in the 6th and 7th Divisions, thought to be due in part to fatigue after campaigning, though no doubt the prolonged close contacts of more static duties of an occupation force, contrasted with the higher mobility of action are of themselves an important predisposing cause of infections.

On 1st November a change was introduced in the general organisation. The Palestine and Transjordan Command ceased to exist, and a new Ninth Army came into being, corresponding with the Eighth Army formed a little earlier in Egypt. General Sir H. Maitland Wilson commanded this Ninth Army and controlled all troops in Syria and Lebanon. Lieut-Colonel Saxby was attached to the army headquarters staff as an Australian medical representative.

Ski School. During November a ski school was organised by the I Australian Corps. This was held at the Cedars, a mountain resort some 2,000 feet below the *Col des Cèdres*, where the road crosses the Lebanon at a height of 8,745 feet. Here the cold and the high elevation demanded supplementary rations and for this purpose the addition of the following extras was approved: 2 ounces bacon, butter and sugar, 1 ounce tinned milk and $\frac{1}{2}$ ounce cocoa. Conjunctivitis was a common complaint among those attending the school. Special arrangements were made for handling of casualties; and two methods were evolved, one using a light French type of stretcher mounted on skis, and another making an emergency stretcher with the wounded man's skis and sticks, applying special clamps to the skis. Even apart from the special risks in ski-ing, accidents became much more frequent on the steep roads. The first light falls of rain on tortuous mountain roads brought many vehicles to grief, and snow intensified the risks. In December it was necessary to remove all patients from the 2/2nd Field Ambulance from the Bekaa Valley to the coast near Beirut. Even ambulance trains found difficulty in running, although special protection was provided to railway tracks in Syria to cope with heavy falls of snow. In December the cold intensified and the snow in some parts was so heavy as to impede the delivery of supplies; some field medical units were isolated for periods of several days. Malaria, as might be expected, practically disappeared during the cold weather. In January there was a week of very severe weather over most of the occupied area. Units were cut off from all communication in several places, with temporary dis-

ruption of telephone, light and power and the roads were blocked with snow. Even at Ez Zib near the coast the temperature did not rise above 10° for four days.

THE MILITARY POSITION CHANGES

A change in the general hospital policy took place at the end of December. Instead of being held in Syria patients were sent on to Palestine; the forward units no longer acted as C.C.Ss., and the C.C.Ss. no longer as hospitals. This policy relieved the strain of transport under difficult conditions, but more important external conditions were really responsible.

The British forces in the Middle East had the task of preparing an offensive against Rommel in North Africa and defending Syria in the event of the Germans overcoming the Russians' resistance and advancing through Turkey. This resistance had stiffened with the successful Russian counter-offensive in the winter, beginning in November 1941, and in turn offset to some extent the difficulties which the British armies in Egypt had experienced in building up reinforcements of men and material for the coming trial of strength. While forces were being built up in the desert the threat of hostile interference from Japan became more ominous. Japan, a former declared ally of Britain, had determined on an independent path of ambition, and had sealed that determination in 1931 by occupying Manchuria in defiance of previous undertakings. More recently the linking of three partners of the so-called Berlin-Rome-Tokyo axis drew pointed attention to the dangers inherent to the British and American nations, especially in the Far East and South-West Pacific. These threats culminated in the lightning air attack of the Japanese on Pearl Harbour on 7th December. Britain and the United States of America were now at war with Japan, and Australia also declared war. The bombing of Patani and Singgora in Northern Malaya by the Japanese was followed by an invasion of land forces on the Malayan peninsula and at several points in the Netherlands East Indies. These hostile actions created a most perilous situation for Australia, and by agreement between the British and Australian Governments two Australian divisions were withdrawn from the Middle East theatre of war for action in the Far East and the defence of Australia.

A few days later, on 10th December the investment of Tobruk came to an end, but the improved position in Africa did not substantially lessen the danger in the East. The Russians continued to counter German successes on the Black Sea, and Rommel early in January retired to El Agheila. Long range strategy demanded that the Axis powers should be expelled from the Mediterranean littoral of Africa, with a view of future invasion of Europe. It was decided that the 9th Australian Division should remain in the Middle East to take part in future desert actions, in which it was hoped that the German forces would be not only repelled, but destroyed, and that for the present the division should contribute to the further defence of Syria. Therefore the released 6th and 7th Divisions of the A.I.F. were brought back to Palestine to join movement "Stepsister".

The destination of this movement was a top secret, and, though the men of these two divisions could at first guess their next assignment with some accuracy, the situation was more obscure when the movement became reality at the end of January 1942. This part of the story must now be left for later telling, while we follow the fortunes of the 9th Division in the Middle East.

THE 9TH DIVISION TAKES OVER

The 9th Division was sent into Syria shortly after its release from Tobruk, and its units relieved the corresponding units of the 7th Division. In January 1942 the 2/11th Field Ambulance (Lieut-Colonel W. W. Lempriere) took over the hospital run by the 2/4th Field Ambulance; the nurses were detached to their own units. All seriously ill patients were sent to the 2/3rd Casualty Clearing Station in Beirut, and some assistance was given by local civilian practitioners in X-ray and pathological work. The other ambulances of the 9th Division also took over hospitals, the 2/3rd Ambulance (Lieut-Colonel J. M. Dwyer) at Le Gault French Hospital in Tripoli, and the 2/8th Ambulance (Lieut-Colonel B. S. Hanson) at Aleppo. Patients were evacuated by ambulance train three times a week to Damascus. At this time some anxiety was felt over the number of refugees coming in from Turkey, especially as there were rumours of typhus fever in the Balkans. Numbers of these passed through the 2/15th Battalion, whose medical officer was instructed to examine all refugees and to see that disinfestation was carried out, after which they were kept in a compound up to twenty-one days. Disinfestation of clothing had already been found occasionally necessary in men entering field medical units for treatment of minor disorders. Part of the 2/8th Field Ambulance opened a camp reception station at Latakia in the grounds of a Franciscan monastery.

The medical position at the beginning of 1942 was as follows: the A.D.M.S. of the 9th Division, Colonel Furnell, was in administrative charge of medical arrangements for the Australian troops in Syria and the Lebanon. The three field ambulances covered the troops areas with the usual organisation, the 2/8th Field Ambulance at Aleppo and Latakia, the 2/3rd Ambulance at Le Gault Barracks Hospital at Tripoli and the 2/11th Ambulance at an Italian hospital at Tripoli. The 2/4th Field Hygiene Section, relieving the 2/2nd Hygiene Section was stationed at Chekka. The 2/1st C.C.S. had left without special relief by any other unit, and the 2/3rd C.C.S. carried on the work it had already been doing in Beirut. There was still no general hospital in Syria, but after the 6th and 7th Divisions had sailed, and with them the 2/1st, 2/2nd, 2/4th, 2/5th and 2/9th Hospitals, the 2/6th and 2/7th General Hospitals remained in Palestine. The 14th Special Hospital having worked for less than three months, also left the Middle East at the end of January 1942, and was not replaced by a separate special unit in Syria. Patients needing treatment for venereal disease thereafter were sent straight to the 8th Special Hospital in Palestine. Medical units holding patients were com-

fortably housed in Syria during the winter: the buildings occupied were usually solid and well warmed. Tents were satisfactory in some of the districts near the coast, but the advantages of buildings were obvious. Water supplies were usually good: at Aleppo in the absence of reliable information concerning the bacterial content precautions were taken by boiling and chlorination.

During February some movement was observed in mosquitoes in the coastal area, and as an anopheles had been caught in one battalion area, nets were again advised. Arrangements were made to begin spraying villages to kill hibernating mosquitoes, for, although the official army information stated that the malaria season began early in April, local information placed it in the first week in March. A malaria school was conducted at the American University in Beirut during February for regimental medical officers and others selected from the combatant units. Meanwhile the 2/2nd Field Hygiene Section had been busy continuing the work of canalising streams to prevent breeding of mosquitoes, and also spraying to kill adult mosquitoes. The 2/13th Field Ambulance, which had moved the corps rest station from Ez Zib to Mruj and Dhour Chouer left Syria at the beginning of February.

In March there was news of a possible movement of the 2/3rd C.C.S. from Beirut, but this was cancelled, and instead there was a reversion to the previous policy, by which this unit held patients for treatment of conditions within its resources, provided they could be discharged in reasonable time. A further change was approaching, the establishment of a general hospital in Syria. Buildings were begun on a site at Sidon on the coast, and here the 2/7th A.G.H. was to be placed when accommodation was ready. A little later the 2/4th Australian Convalescent Depot was formed, also to be sited at Sidon. Meanwhile the disposition of patients proceeded as before.

A malarial survey of the Tripoli fortress area was completed in March. Some units were found to be sited in malarious areas, and their camps were moved, though there was little mosquito breeding noticeable at the beginning of April owing chiefly to recent rains. Malaria control was being carried out actively. The 3rd, 4th, 5th and 6th Anti-malarial Control Units were completed, and each squad worked under the medical officer of the combatant unit in the area. Streams and pools were treated, and maintenance carried out, and notices were posted at all bivouac sites stating whether these were safe to use or not and what precautions were to be taken. Educational measures such as posters, circulated instructions and short courses on malaria control were adopted as soon as possible after Syria was occupied. As the weather became warmer enormous numbers of anophelines appeared in some areas, and the malarial risk was as usual increased by troop movements. For example, the move of the 20th Brigade to Aleppo so intensified the risk of infection there that atebrin was used as a suppressive: 0.2 gramme was given twice weekly.

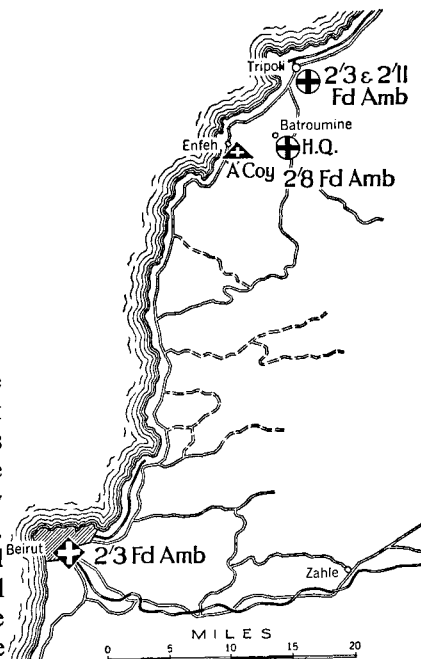
During April 1942 the nurses attached to the 2/8th and 2/11th Field Ambulances returned to their units, and were replaced by nurses from

the 2/6th and 2/7th General Hospitals, specially selected for their ability to instruct orderlies. In order that staffs of field ambulances might have field training the 2/8th Ambulance moved into the French hospital at Tripoli late in May, freeing the 2/3rd Ambulance for training in different types of country, including desert. By this time the incidence of dysentery and malaria was again increasing.

In June there was a general feeling of unsettlement, engendered by the German successes in the Western Desert, culminating in the retaking of Tobruk and finally the advance of Rommel's army to El Alamein. This uneasy feeling was enhanced by the rescinding of orders of movement soon after they were received, but it was known that the order for a general movement of the 9th Division to Egypt could not be long delayed. Early in June the 2/3rd C.C.S. took over the Italian hospital at El Mina in Tripoli from the 2/11th Field Ambulance, while a British C.C.S. took over the site in Beirut. The 3rd N.Z. General Hospital opened in Beirut in June and took care of the Australian patients left in the 2/3rd C.C.S. The 2/11th Field Ambulance then took over the hospital in Le Gault Barracks in Tripoli, until its own hurried move to Egypt: this hospital had previously been run by the 2/3rd Ambulance. The 2/8th Field Ambulance occupied the French hospital in Aleppo until June, and then handed over to the 6th N.Z. Field Ambulance. At the same time the 2/7th A.G.H. packed up at Kafr Balu in Palestine and sent an advance party to open the hospital at Sidon. Further movement was stopped, but the hospital opened and started work, only to be ordered to close on 28th June and to proceed to Buseili in the Nile Delta. The 2/4th Convalescent Depot likewise was sent to Sidon, but little was done to develop this unit there before it was sent during July to a site at Tolumbat, on Aboukir Bay in Egypt.

By the third week in June the medical units caring for the 9th Division had packed up and were ready to move. The field ambulances moved, each with a brigade, starting with the 26th Brigade which moved on 26th June. The 2/3rd C.C.S. moved on 9th July.

Many changes occurred during this phase of the occupation of Syria, most of which were a more or less distant reflection of military affairs elsewhere. Medical administration in the beginning was controlled by the



Occupation of Syria, May 1942.

I Australian Corps, and each of the three Australian divisions in the Middle East occupied in turn parts of this country, so varied in terrain, and in seasonal climate. The corps administration included for a time British medical units also, but when the corps left the Middle East the Australian medical work chiefly consisted of that controlled by the 9th Division. Since we are concerned with the activities of Australian troops it is now of interest to enquire what standard of health was maintained during the occupation, and what diseases were encountered.

ANTI-MALARIAL MEASURES

Malaria has priority as the most important disease in Syria, where there were some additional features of local interest. One of the most significant of these was the formation of special units for carrying out anti-malarial work, for the first time in the Australian Army. Administrative Instruction No. 5 of the I Australian Corps states:

There will be two control units known as 1st Australian Anti-malarial Control Unit and 2nd Australian Anti-malarial Control Unit respectively.

Officers were appointed to command these units, which were raised from the 2/2nd Field Hygiene Section and comprised a staff of seven other ranks. Five malaria control units were formed in all and attached to the 7th Division and unit squads were trained. This was a most important innovation which marked the beginning of a new phase of malaria prevention in the Australian Army, and these units did most valuable work both in the instructional and constructional field.

Anti-malarial courses were begun immediately conditions were reasonably stabilised after the campaign, and important control works were begun by Croll's 2/2nd Field Hygiene Section, with the advice of Lieut-Colonel Mulligan, Indian Medical Services, and Major Leeson, R.A.M.C., malariologist and entomologist respectively. *Anopheles superpictus*, *elutus* and *bifurcatus* were the most important vectors in Syria; the former was found breeding in the chains of pools in the Beirut River. A canal nearly a mile and a half long was dug to secure fast running water, and necessary oiling carried out. Labour was a difficult problem, and native labourers were hired by the engineers; the first offering belonged to other trades, and would not dig, but an employment bureau on the spot soon produced fifty workers. Other drainage works were carried out under the supervision of the 2/2nd Hygiene Section, such as draining the Chekka swamp with a canal and flood gates, emptying and controlling large waterholes at Homs, and drainage of irrigation canals and wadis at many places. These works were of a magnitude usually not attempted by field hygiene sections, even with additional labour. From August onwards standard protective measures were enforced, and mosquito breeding was controlled in important localities by spraying, oiling, and dusting with Paris green. In addition to mosquito surveys, the habits of local flies were studied, and other work was also carried out on water supplies and sanitation. The larger centres were supplied with good water coming from the uplands, but the outlying units were not always so well served and had to take the usual precautions.

Water supply in the towns was sometimes concerned with the propagation of malarial mosquitoes. *A. bifurcatus* usually bred in dark wells under the houses, and had to be controlled by judicious spraying and oiling. During Allenby's occupation of Jerusalem a generation earlier the same measures were necessary.

The malarial problem in Syria was intensified after the armistice, as it was essential to take immediate steps to protect the troops of occupation. To do this thoroughly meant surveying about 1,000 square miles, collecting larval and mosquitoes and estimating spleen rates. There was also a shift of native population which introduced disturbing factors. The I Australian Corps gave full cooperation and issued the following order on 14th July 1941:

Owing to incidence of malaria, special care must be taken to avoid malarious areas for camps. Commanders will consult medical staffs, who should be included in reconnaissance parties, and medical advice will be followed unless urgent reasons cause other action. All informed.

Notwithstanding this order, and the expressed opinions of eminent local authorities on the medical and industrial aspects of malaria, some military officers were still sceptical. Surveys showed that *A. superpictus* was very common in the coastal areas, where spleen rates were often high, occasionally up to 100 per cent. Overprint maps were prepared, and large notices were fixed through the country indicating to troops on the move which areas were "highly malarious" and which "safe for malaria". Breeding control was instituted in some places. Leave trips for the troops were permitted later, and a good deal of control was needed to ensure that itineraries provided safe stopping places each night. In August protective clothing, the use of nets at night, the use of cream and the taking of suppressive quinine were ordered for all men on leave, and directions were given to assist wise choice of bivouac sites, away from low, swampy or irrigated areas. Later the 2/3rd Australian Field Hygiene Section took over preventive measures for an area stretching from the hills near Beirut to the Rayak plain. Suppressing quinine was continued up to September and October 1941, 5 grains daily, later increased to 10 grains. Administration of the drug was not closely supervised and there is little doubt that quinine was not taken by all men. Spraying was usually done with "flysol" or similar preparation with 3 per cent pyrethrum extract, or naphthalene, creosote and iodoform in kerosene. Up to the end of November 1941 there were 1,250 reported cases of malaria in the 7th Division, and the infection rate over a six months' period was less than 10 per 1,000 per week. The actual infection rate must have been higher, as numbers of recurrences occurred later in men who had been in Syria, though apparently well at this time. The importance of the malarial control work there lies not merely in its achievement, but rather in the fact that a foundation was laid for much more extensive and responsible work in the time to come.

The diagnosis of malaria was accurately carried out once conditions were stabilised: the help of the mobile bacteriological laboratory was

valuable. Treatment offered no special problems; in Beirut patients were sometimes sent to the rest camp where treatment could be continued. Not infrequently a man labelled as "P.U.O." would be found to have malaria. The only deaths which occurred were those of one man who had cerebral malaria and of four others who had other coincident infectious diseases; one man died of malignant and quartan malaria. In December on the advice of Colonel Fairley all patients with relapses were given intravenous quinine for three days, followed by a standard sequence of atabrin and plasmoquine. The total number of cases of malaria in the A.I.F. in the Middle East during 1941 was 2,435, a rate of 31.8 per 1,000 strength per year. Consideration of the combat and base areas occupied by Australian troops during that period shows that the majority of these came from Syria. Before leaving the purely preventive activities of the medical services mention must be made of a radical and important change made in the organisation and administration of the Australian Army Hygiene Services. Colonel M. J. Holmes, Director of Hygiene at the Australian Army Headquarters devised and introduced this system, which abolished field hygiene sections as such, and placed trained personnel in every major unit, and maintained adequate central control.

OTHER DISEASES

Infective hepatitis was a troublesome disease: between August 1941 and January 1942 the 2/3rd C.C.S. treated 639 cases. In the earlier stages of the epidemic a number of men arrived as yet undiagnosed, but jaundice appeared with some regularity about the fourth day. The symptoms are fully described elsewhere and need no further emphasis, save to point out that anorexia and nausea were symptoms of great constancy. Intense depression was a frequent sequel.

Diphtheria appeared at intervals throughout the whole period of Australian occupation of Syria: it was sometimes seen in members of hospital staffs, suggesting the advisability of performing Schick tests on persons exposed to infection. The wisdom of administering antitoxin to adults within easy reach of a diagnostic centre was seriously questioned, as in some of these cases the difficulty of establishing a diagnosis was increased, a matter of some epidemiological importance. Other forms of upper respiratory tract infection were common, outstanding points were their frequency during the coldest part of the winter, and the high incidence of sinusitis. Cerebro-spinal meningitis appeared at irregular intervals chiefly during the months of February and June; all patients recovered with sulphapyridine.

Dysentery was prevalent, the incidence was highest in August 1941, gradually diminishing as the weather became cold, and once more increased in April of the following year. The predominant type was Flexner, and no serious epidemic occurred. The results of a special investigation carried out in the earlier months of 1942 on dysenteric therapeutic methods helped to confirm the value of sulphaguanidine as a specific. Amoebic infections were not seen in great numbers, but later experience has illustrated the

considerable latent period which may elapse before overt symptoms appear.

Enteric infections formed a group of thirty-three cases seen at the 2/3rd C.C.S.; probably this represents the total incidence in Syria during the occupation. Careful investigations of the soldiers' living conditions were carried out, but no conclusions could be drawn, as infections occurred equally in barracks and in open camps, and in sewered and unsewered areas. Convalescent whole blood or serum was used in treatment and appeared to help tide very ill patients over critical periods in their illness.

Relapsing fever, an endemic disease, was found in moderate numbers in Syria. The diagnosis was helped in some instances by a history of exposure in the haunts of the vector ticks, and also by neurological signs. A considerable number of the cases occurred in men who had been in Tobruk. As usual, spirochaetes were often difficult to demonstrate in the blood; incubation of blood samples was tried without success.

Intestinal parasites were common in Syria; infestation by tapeworm not infrequently needed treatment. The most usual form was *Taenia saginata*; excepting for the usual care necessary in ensuring complete removal of the upper segments no special difficulties arose in dealing with these helminths.

Rabies was also endemic throughout the Middle East, and is conveniently mentioned here. Though more common in Egypt, it also occurred in Palestine, and in Syria and Lebanon was frequent enough to warrant special facilities for prophylaxis. In Palestine dogs were not officially allowed in camps, and instructions were issued that any instances of bites from dogs or jackals must be reported. The treatment was immediate cauterisation, followed by a course of specific prophylaxis at an anti-rabies centre. There was a special centre at Jerusalem under Dr V. S. Krikorian, of the Public Health Department and civil centres at Gaza, Majdal and Ramleh. In December 1941 an anti-rabies clinic for Syria and Lebanon was formed at the 2/3rd C.C.S., in charge of Major Bruce Hall who attended a special school in Jerusalem. Supplies of vaccine were held in Beirut, and the full anti-rabic course of injections of 5 c.cm. of vaccine on each of fourteen successive days was given when necessary. The rabid animal was killed and the brain preserved for examination. Late in 1941 an increase in rabid jackals was reported in Syria, and between August 1941 and July 1942 ten men were sent for prophylactic treatment. No cases of rabies occurred among the troops.

Two other important types of infective disease remain to be dealt with, short-term fevers and venereal disease. A number of special features of importance relating to the experiences in Syria with short-term fevers which merit detailed attention. The label "pyrexia of unknown origin" may be used with some reservation, for in a considerable proportion of cases the implied doubt in this diagnosis was only in the early stages. Sandfly fever appeared in epidemic form in the summer of 1941 and again in 1942. The first cases in 1942 were seen in April and did not conform to the type previously seen, but study of a large outbreak in a field punish-

ment centre established the diagnosis without doubt. This is a good example of the well known difficulties in diagnosis of a disease whose signs may vary considerably, as do those of all epidemic diseases, until the outbreak reaches some density. Lethargy was characteristic in 1941, but was much less common in 1942. Early in 1942 cases of pyrexia of short duration were seen, which were apparently of identical type, but did not appear to conform to the pattern of sandfly fever or other infection to which a name could certainly be given. The symptoms were the familiar febrile malaise; no other physical signs were demonstrable. Fever was fluctuating in type and rose till about the third day it reached 104° or 105° F. and subsided in the same way, reaching normal about the 7th or 8th day. Groups of men so affected were seen in the 2/3rd C.C.S. at Beirut, the 2/11th Field Ambulance in Tripoli and the 1st New Zealand C.C.S. at Zahle. Pathological examination revealed no parasites or organisms in the blood, and the serum did not agglutinate *Proteus*, *Brucella melitensis*, or any of the enteric group.

From July to December 1941 a series was analysed at the 2/4th Field Ambulance at Tripoli: 80 per cent of pyrexias were considered to be due to sandfly fever, though sandflies were found only in small numbers. No vectors of dengue were found, but no sustained investigation was possible. In 1942 Captain K. J. Grice and Lieutenant J. Chvapil studied a number of cases of fever at the 2/11th Field Ambulance, and felt that they were suggestive of mild typhus, which was stated to be endemic in the area. Clinical evidence supported the possibility, but the serological findings were inconclusive. Colonel Furnell in his quarterly report on 30th June 1942 classed the pyrexias into three groups (1) a fever of the sandfly type, (2) a disease of the murine typhus group, a few agglutinations being found with OX19 and X, (3) fevers of five to seven days' duration of undetermined type.

Venereal disease caused anxiety soon after the Syrian campaign ended, and continued to do so till troops left the country. The incidence, and the methods used in preventing infection are described in Volume I. The remarkable experiences in Beirut and Tripoli are there recounted; here, brief reference may again be made to the successful experiment of permitting brothels under strict disciplinary and medical supervision. This saved many men from taking almost certain personal risks in villages, though the figures of the attendances at the prophylactic centres form a sad social commentary. Treatment was given at first in a clinic under the same roof as the 2/3rd C.C.S., but later in the 14th Special Hospital at Bhamdoun. In January 1942 approval was given for its establishment as a 400 bed hospital, but by the end of the month the unit was ordered to join the move "Stepsister", and proceeded to Palestine, *en route* for Australia. From the point of view of prevention the emphasis was always laid on the need for education and of amenities, and the provision of prophylactic centres. The latter at least could be linked up with the work of a special hospital, which could advise on standard procedures, and supervise the work in preventive centres. Colonel Norris in trying to

reduce the incidence of venereal disease in the 7th Division found that these centres were often badly sited, a trouble which was met to some extent everywhere. One unusual task was performed by the 2/2nd Field Hygiene Section when this unit staffed preventive ablution centres for nearly eight weeks soon after the cessation of hostilities in Syria. In this time over 400 men passed through the centre daily, 75 per cent being Australian troops, and in all some 18,000 treatments were given. Only sixty-one of these men contracted venereal disease, which must be reckoned as a reasonably successful outcome of the work. Even with better organised facilities in 1942 venereal disease was reported by the A.D.M.S. of the 9th Division as still being a major problem in Syria.

Most of the psychiatric casualties in Syria occurred during the campaign, when special arrangements were made at Ez Zib. Here in good surroundings with adequate accommodation and sea bathing, Major Gwyn Williams treated men with fear and anxiety states. After the armistice there was no need for this service, and the 2/13th Field Ambulance, which had run the rest station at Ez Zib, moved to Dhour Chouer, and opened a rest camp which could take up to 1,200 men. This unit was able to relieve the strain on other holding units in Syria, acted as a malarial treatment centre and helped to carry out the policy of conserving manpower.

SURGICAL WORK

Surgical work did not include any battle casualties in the period under review; the chief conditions treated were fractures and burns. The frequency of fractures of the lower part of the radius, the lower third and the malleolus of the fibula and the carpal navicular bone, deserves special comment as a reflection on the dangers of transport under peaceful conditions. A few severe skull injuries were seen; in fatal cases severe multiple injuries were also present. Most of the soldiers involved in these accidents were despatch riders, in whom the incidence of all kinds of injuries was very high. The danger of riding motor cycles on the tortuous, steep and, during the cold weather, often slippery roads of Syria was much greater than that of driving a motor vehicle, and even that frequently had its times of peril. Men with major fractures were sent on to the base hospitals after shock had been treated, necessary manipulations carried out, and immobilisation achieved by the use of plaster. In Beirut at the 2/3rd C.C.S. the need for an orthopaedic table was felt, and the Australian Light Aid Detachment under directions of the surgeons of the unit constructed a suitable table which was invaluable in immobilising fractured limbs, and far superior to the pelvic rest supplied. Thomas splints were used only during transportation of the patient from field ambulances to the C.C.S., but even here their use left much to be desired. The fit of the splints was frequently faulty, and immobilisation was seldom achieved, mainly because a large poorly fitting ring permitted the splint to ride up and loosen the extension. In spite of instructions to the contrary a clove hitch was sometimes used for extension.

Burns were also frequently seen. The practice was adopted as far as possible of two surgeons carrying out necessary toilet of the burnt area under anaesthesia, so as to lessen the time occupied. After a thorough toilet wet gauze was applied to face, hands and feet, after a light dusting of sulphapyridine powder, and the limbs and trunk were tanned with 10 per cent tannic acid and then 10 per cent silver nitrate. Triple dye was also used, but with less success. The best emergency treatment was found to be morphine and the application of a temporary dressing of saline, bicarbonate of soda, picric acid or acriflavine. Adequate stocks of dried plasma at the C.C.S. were found indispensable.

Most of the other surgical activities concerned operations of the non-urgent variety, and the treatment of septic ulcers, here usually called "Syrian sores". By far the greater number of these sores occurred in the months of August and September. Possible factors suggested for this apparently seasonal distribution were lack of a balanced diet, some lessening of resistance during the campaign, lack of care in treating abrasions, lack of facilities for washing and the omnipresent flies. No constant bacteriological findings were reported; the bacterial flora were usually mixed in type, and sometimes included diphtheroid organisms. Infections of this kind seemed to respond well to the local application of anti-diphtheritic serum.

The dental clinic in Syria was kept busy, as is usual during a lull in military operations. Service was given to British forces, members of the Royal Navy and Royal Air Force, as well as Indian troops. The number of fillings inserted was more than double the extractions, and many gingival treatments were given. Hundreds of dentures were made, over 600 in the C.C.S. clinic alone. Appliances for fractures of the jaws were also made in cooperation with the surgical staff. Though radiological work was carried out in Syria, it was with some difficulty. Local assistance was available in Beirut and Tripoli, but most of the work devolved on the 2/3rd C.C.S. When this unit arrived in Beirut it possessed no X-ray apparatus, and at first patients had to be taken to the American University Hospital. In September a portable unit was obtained, which had only limited application, and a mobile unit capable of doing ordinary work, was later acquired through courtesy of the British forces. The mobile unit had its own generator, which was more reliable than the line supply of Beirut, and though without a Potter-Bucky diaphragm, was able to fill most requirements.

During the period of Australian occupation of Syria the greatest assistance was given by numbers of organisations and individuals; the American Consul in Beirut and the American University of Beirut in particular. Technical advice and help from library facilities and even loan of apparatus were freely given by the University Medical School, and the Beirut University Medical School held combined lectures and clinical meetings with the staff of the C.C.S. and neighbouring medical units.

In general, from the point of view of health and hygiene the occupation period terminated on a rising note. The hazards of Syria were considerable

for a force in action, and also for a garrison force. Once the campaign was over prophylaxis exerted a steadily growing pressure, and in spite of those anxieties and temporary losses of manpower which have been mentioned, the 9th Division, facing a responsible task in the Western Desert, was fit and ready when the movement south began at the end of June 1942.

CHAPTER 17

EL ALAMEIN

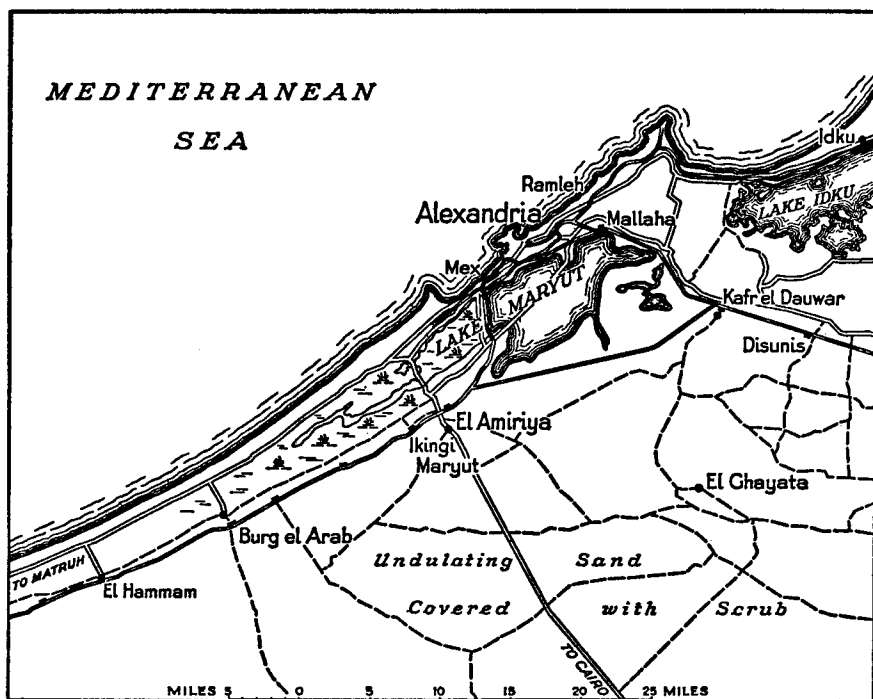
THE strategic position in Syria and Egypt has been outlined in the previous chapter. When the major part of the Australian forces in the Middle East returned to Australia the 9th Division remained. After being relieved in Tobruk this division had been assigned the task of defending the Lebanon and Syria, in particular the fortress area south of the Turkish border. By the early part of 1942 there was no imminent threat of an enemy force attacking through this region, and the fluctuating tides of battles in the Western Desert clearly showed that there the future of North Africa would be decided. The 9th Division appreciated the honour and the opportunity of joining the Empire forces in the desert, and the men, experienced, trained and hardened by the Syrian winter, were ready for this important assignment.

THE MOVE OF THE 9TH DIVISION FROM SYRIA

The move brought with it important changes in the medical services. One feature of medical interest in the military work in Syria was that no Australian general hospital had been established there. Since the occupation the work of a general hospital had been carried out by the casualty clearing stations at Beirut, and by the hospitals in Palestine. Early in 1942, however, the improved local situation in Syria led to a decision to establish an Australian general hospital at Sidon on the coast. Buildings were prepared, the 2/7th A.G.H. which had closed at its previous site at Kafr Balu in Palestine and was waiting in camp for word of further movement, was instructed to set up at Sidon. On 28th June, however, movement was suspended, and it seemed that this was part of a general change of plan. The 2/6th A.G.H. had taken over the hospital area at Gaza in Palestine, so long occupied by the 2/1st A.G.H., which had returned to Australia. The 2/1st Casualty Clearing Station had closed at Beirut and left for Australia early in February 1942. The 2/3rd C.C.S. after being stationed at Beirut since shortly after the occupation of Syria, took over the Italian hospital at El Mina at Tripoli during June, and continued working there till early July. The field ambulances of the division, the 2/3rd and 2/11th at Tripoli and the 2/8th at Aleppo were also closed in their existing locations and attached to corresponding brigades for the purpose of movement into forward areas in the Western Desert.

The British forces in the Western Desert had been forced to withdraw on 26th June, and axis troops and armour were following on closely. By 5th July the whole 9th Australian Division was disposed at Amiriya near Alexandria, and leaving a small nucleus for protection of the delta area, the main body moved forward and reached the area El Hammam-El Alamein by the 8th July. This urgently made move was headed by the

26th Infantry Brigade. The three brigade groups of the 9th Australian Division were each scheduled in turn for a fortnight of desert exercises at Forqlos, between Homs and Palmyra. The 24th Brigade with the 2/3rd Field Ambulance completed its exercise, but the 26th Brigade with the 2/11th Field Ambulance reached Homs with all vehicles loaded, only to be sent on through Bekaa Valley *en route* for Egypt. In order to deceive enemy agents unit markings were concealed and hats were changed to steel helmets, but the local inhabitants recognised the troops by various things, including their tan boots. Incidentally the value of this manoeuvre



Alexandria area.

was possibly offset by the increased risk of traversing a malarious area at this time of year. The 2/8th Field Ambulance had occupied a hospital in Aleppo, and early in June handed over to the 6th N.Z. Field Ambulance. When the N.Z. Division preceded the 9th Australian Division to Egypt on 17th June the 2/8th Ambulance returned to Aleppo for a short time. Here work was carried out with the help of nurses, but was not continued long, for the nurses were removed on 29th June, and by 4th July this field ambulance had arrived at a very congested assembly area at Alexandria with the 20th Australian Infantry Brigade. The 2/3rd Field Ambulance after running a hospital at Tripoli also with the help of nurses, and coping with a considerable epidemic of an unidentified short-term fever, closed, and on 1st July moved to Ismailia and thence to Amiriya.

ARRIVAL IN WESTERN DESERT

With these hurried movements the field units reached the threshold of the desert area where the division was to participate in the coming struggle. Meanwhile, the 2/3rd C.C.S. left behind early in July as the sole Australian medical unit in Syria, was relieved by the 120th British Light Field Ambulance, and thus freed to participate in the move south, arrived at Ikingi Maryut on 12th July.

The 2/7th A.G.H., commanded by Colonel J. G. Hayden, had sent a surgical team to Egypt on 30th June for work with a forward unit, and on 5th July opened the hospital at Sidon and began to take patients. The Australian convalescent depot authorised on 23rd May 1942, was first assembled at Sidon in June under Lieut-Colonel G. Fitz-Hill, and began to prepare for up to 500 patients. The Australian forces in the Middle East at this time comprised the 9th Division, A.I.F., in Egypt and the establishments at the Australian base area in Gaza, Palestine, where the A.I.F. headquarters was placed. The medical units were the 2/6th and 2/7th A.G.Hs. of 600 and 1,200 beds respectively, 2/3rd Casualty Clearing Station, 2/3rd, 2/8th, and 2/11th Field Ambulances, 2/4th and 2/6th Field Hygiene Sections, and the 2/4th Convalescent Depot.

The 9th Division was attached to the XXX British Corps of the Eighth Army. This corps included also the 51st Highland Division, the 1st South African Division and the 4th Indian Division. Medical arrangements for the corps were controlled by the D.D.M.S. Eighth Army, Brigadier J. Walker, and D.D.M.S. XXX Corps, Brigadier Austin. Colonel J. Steigrad was D.D.M.S., A.I.F. in the Middle East, Colonel H. G. Furnell A.D.M.S. of the 9th Division, and Major J. S. Peters D.A.D.M.S.

No time was lost in sending the 9th Division forward to join troops in the area behind the Alamein line. For the purposes of this advance into the desert mobility was essential. Accordingly, each of the field ambulances accompanied its brigade into the forward area, with the headquarters, one company and a mobile section from another. There was the usual shortage of transport: this was relieved in the main by vehicles loaned from the Australian Army Service Corps. The area assigned to the 9th Division was on the coast, one recognised as being of great importance, as it included the only transport arteries of road and rail, and its security was vital to the British right flank.

TERRAIN

The country in which two opposed forces faced each other was in some ways similar to other parts of Libya and Cyrenaica, but one important difference lay in the restricted area in which the battle for North Africa was shortly to begin. A strip of country along the Mediterranean coast carried a railway which had been extended westward to Tobruk in 1941, and a road closely following the coast from Alexandria. In the region of Alamein defensive line the armies were disposed in a narrow belt of desert, which was only some thirty miles wide from the Qattara Depression to the sea. This depression, in places below sea level, was marshy and

treacherous for motor transport and even for loaded camels. Though shallow and flat, it was flanked by a steep escarpment, which became a more precipitous barrier farther westward close to the sea. Beyond the depression to the south stretched the seemingly limitless sea of sand dunes of the Libyan desert. In the section allotted to the Australians along the coast were good beaches, and the climate was pleasant. A little inland from the sea stretched a low range of sand dunes, and beyond this a flat salt pan never wider than several miles. Beyond this again over a low escarpment lay a stretch of desert, stony and flat except for occasional inconspicuous ridges, rising in dusty clouds with every wind and every vehicle that passed over it. In this waste land a "line of defence" was really a number of heavily manned strong points behind wire and minefields, and the smallest rise or declivity was a potential site for a defensive position. Extensive minefields, many of them hundreds of yards in depth were a menace to movement, which was always dangerous in daylight on this featureless terrain which afforded no protection or shield from observation. In the desert there were few places as such, merely objectives; even the most inconsiderable cairns of stone or ruins of mud huts were welcome guide marks.

From the medical point of view the secure holding of the coastal strip was of great importance, as it provided the links of communication between the forward areas and the advanced bases. Ready access was specially desirable to a medical concentration area which had been set up in the Hammam area, including Gharbanayat, which was a railhead, and Burg el Arab.

The 2/3rd Field Ambulance had the earliest Australian experience of medical work in this part of the campaign on 7th July, when a small collecting post was set up to take casualties from a raid on the south flank: a light section from the ambulance accompanied the raiding party from the 24th Brigade.

PRELIMINARY ACTIONS

The 26th Australian Infantry Brigade was soon involved in the action of the XXX Corps against the enemy west of El Alamein on 9th July. In this counter to a previous German thrust an advance of five miles was made, and commanding ground at Tel el Eisa was captured which had given the enemy good observation over the defended area at Alamein. This valuable gain was held, though over ensuing weeks many attempts were made by the enemy to dislodge the Empire forces. Foothold on the coastal area was thereby strengthened and communications made more secure. The 2/11th Australian Field Ambulance under Lieut-Colonel W. W. Lempriere accompanied the 26th Brigade forward, after obtaining medical supplies at the 7th British Advanced Depot Medical Stores at Ikingi Maryut. Attached to the unit was a surgical team from the 2/7th A.G.H., Major T. Giblin and Captain C. B. Berryman. Extra ambulances were borrowed from the other two Australian field ambulances, the 2/3rd and 2/8th and the 16th British Motor Ambulance Convoy. During this action the unit handled all the casualties for the division from attacks and

counter-attacks over a period from 10th to 25th July. The main dressing station was in the Tel el Shammama region, set up several miles behind the battle area, far enough to permit all necessary urgent surgery to be carried out. Two small advanced stations were also opened, and with a "cab rank" of ambulance cars and a car post near the rearward of these, prompt movement of wounded was secured.

Following this initial action the 24th Brigade undertook a further series of attacks to stabilise the coastal position, where the deep forward thrusts had made communications vulnerable. These took place during the period 17th to 22nd July.

Many casualties came through the M.D.S. from both of these engagements. The 2/8th Field Ambulance was with the 20th Brigade Group in the early stage, and being in reserve was able to send a mobile team and vehicles to the 2/11th Field Ambulance. One company was left in Alexandria and afterwards was used in running a rest camp. It will be seen that in these preliminary engagements the same principle was followed as in the first desert campaign in providing forward medical and surgical attention. The divisional front, consisting of the 20th and 26th Brigades, was served by one main dressing station which was reinforced by additional staff from other units, and was allotted additional ambulance cars so that patients could be brought practically direct from aid posts.

On 10th and 11th July casualties were heavy, chiefly from shell and mortar-fire. Considerable strain was imposed on the ambulances, whose drivers worked long hours, but the arrangements worked well. Patients were retained in the M.D.S. until they could safely travel and then were sent by motor ambulance convoy cars to the 14th British C.C.S. in the medical concentration area at El Hammam. Thence they were sent to the 2/6th A.G.H. at Gaza Ridge; one early convoy travelled by the hospital ship *Aba* to Haifa and by train to Gaza. The 2/11th Field Ambulance carried the responsibility of the active M.D.S. till 25th July. This period included several exceedingly busy spells of work, particularly on 17th July when an attack by the 24th Brigade produced many wounded and on the 22nd when another large scale attack began. During the former of these actions the staff of the 2/3rd Field Ambulance was kept continuously working bringing patients to the M.D.S. where the surgical team was constantly engaged. There were many calls for resuscitation and the demand for blood was great, as its value in increasing quantities was more apparent. It should be noted that as early as 14th July numbers of men were treated for exhaustion, largely of psychological origin, and fear states also began to appear. Though it was desirable to treat men so affected in the lines the noise was a bar to proper rest. Captain T. E. G. Robertson, R.M.O. of the 2/24th Battalion treated thirty such men but was in some doubt if it would not be better to give them morphine and other more powerful sedatives, and to transfer them a little farther back than to keep them in the lines.

During the attack on 22nd July, the strain on ambulance drivers was very great, owing not only to the long hours but also to the frequent

necessity of working under fire. Shelling was so heavy during the night that one forward ambulance section had to be withdrawn. Light sections of the 2/3rd Field Ambulance brought in many patients under heavy shell-fire, in some cases through columns of withdrawing troops, and two ambulance waggons were damaged by shell-fire. Little progress was made with this attack, but in forty-eight hours the position became much quieter. There were heavy losses particularly in the Tel el Eisa area, where lay numbers of unburied dead. General sanitation was poor in some places, and everywhere there were swarms of flies.

MEDICAL PREPARATIONS

A new phase of the situation now began, that of preparation for a battle which seemed likely to be decisive. A regrouping of units was made in order to present greater strength in depth. Supplies of many kinds were arriving, and reinforcements were being sent from England. There were difficult problems of logistics in this, for there were long routes which had to be traversed, and passage of the Mediterranean was more hazardous than formerly. However, the forward medical units, though straitened in the supplies of some drugs and materials, were better equipped and organised than ever before, and British medical stores, now returned to Amiriya with the improved situation in Egypt, kept them well stocked with most necessities. Other difficulties arose from technical reasons. For example, a divisional rest station was opened on the coast by Major V. Bulteau with detachments from the 2/8th and 2/3rd Field Ambulances for a time, and later was re-opened and run by the 2/3rd Ambulance. It was not easy to obtain sufficient ordnance equipment for this useful adjunct to medical care, for there was no official establishment, but with help from D.D.M.S. XXX Corps this obstacle was overcome.

Further expansions of Australian medical units were made in Egypt. Another Australian hospital closer than Gaza was needed, and much closer than Sidon where the 2/7th Hospital had been instructed to proceed with developing the unit. On 9th July this unit had 192 beds equipped, on the 21st 588 beds equipped and 188 occupied. The number of patients had increased to 417 by 28th July, and on that day the 2/7th Hospital, having been summoned to Egypt, exchanged equipment with the 3rd British General Hospital, and three days later arrived at Buseili near Rosetta in the delta area in Egypt. Within a few days the hospital was working there, and by the end of August held 500 patients. The 2/6th A.G.H. at Gaza Ridge was instructed to expand to 1,500 beds. The need for a convalescent depot closer than Palestine was also felt; accordingly the 2/4th Australian Convalescent Depot, which was originally intended to supplement the work of the hospital at Sidon in Syria, was brought back on 22nd July to Nuseirat in southern Palestine and from there was moved on 15th August to Tolumbat near Aboukir in the Nile Delta.

As an intermediate holding unit on the route of evacuation from the desert, the 2/3rd C.C.S. under Lieut-Colonel J. E. Gillespie was available. This unit after being brought to Egypt, settled temporarily at Sidi Bisher

and on instructions from Steigrad began to equip for mobile warfare, using a new "G 1098" scale of establishment and equipping its light and heavy section separately. The light section, using Italian panniers, was completely packed up on 23rd July, and expected to be able to shift all its equipment with nine trucks. Some difficulty was found in obtaining a lighting set; trial was made of one large French trailer set brought from Syria instead of the two 1-kilowatt sets supplied. At this stage the arrangements for the heavy section were unsettled; the problem of its mobility was not yet solved.

On 24th July on a few hours' notice the 2/3rd Field Ambulance set up an M.D.S. at the site of a small advanced dressing station on the coast, and on the next day took over the care of casualties from the 2/11th main dressing station three miles away, thus permitting that unit to cease admitting and giving relief after a strenuous spell of work.

These arrangements allowed the forward units to share the work more evenly and to have enough time for rest and further preparation. Experience gained during the month showed that some of the ideas held at the beginning of this action period needed revision. The importance of adequate resuscitation was stressed, and the quantity of blood required was now recognised as being greater than had been previously used. Only limited amounts of blood could be obtained from slightly wounded donors as the proportion of severely wounded was greater than in previous actions, and the resources of the British blood bank at El Hammam were welcome. An old trouble arose with Thomas splints, how to reclaim them from units nearer the base. The presence of a Red Cross representative in the M.D.S. was very helpful in securing prompt supply of special stores. The number of stretcher bearers required was not found as great as expected, since ambulances could reach most aid posts; the bearers were most needed for loading and unloading. Patients awaiting transport were held in shelters under tarpaulins 30' x 30' and 40' x 40'; it was found desirable for all hands in field ambulances to have practice in erecting these. This was all the more necessary as changes in staff had resulted in a number of ambulance officers being relatively inexperienced at the beginning of this campaign, though any such defects were promptly made good. From 10th to 25th July, 1,157 casualties were treated in the 2/11th Field Ambulance M.D.S. Three operating tables were in action in the M.D.S., and the surgical team acted as consultants. The results of treatment were on the whole very satisfactory; the only trouble was one recurrent with all medical units holding patients, that of dealing with the soldiers' kits.

The arrangements made for the reception and care of patients in the areas behind the front line had so far been satisfactory, but expansions were now planned which would secure prompt evacuation of sick and wounded to an intermediate unit, and thence to fully equipped hospitals. This plan followed the classic pattern, and had two advantages; it saved unnecessary travel for the sick, and secured the continuous care of Australian soldiers in Australian units.

HEALTH OF THE TROOPS

The health of the 9th Division was not in all points satisfactory. The men were fit and in good spirit, but endemic disease was causing considerable wastage. The most prevalent disease was diarrhoea; much of this was declared dysentery, though exact bacteriological diagnosis was not always practicable. Sigmoidoscopy was of course an established procedure, and was most useful in differentiating the dysenteries from other bowel disturbances. At the divisional rest station Major R. F. West acted as a medical consultant, and used the sigmoidoscope almost as a routine for this purpose. Infective hepatitis was also beginning to be troublesome in the area, and caused relatively more wastage, because of the longer convalescence it demanded. As summer waned respiratory tract infections increased in number: during September a number of units suffered depletion through an outbreak of tonsillitis.

Fortunately the Australians were in a good area on the coast, where the climate was not oppressive, and the dust less troublesome than farther inland. Most of the water came direct by pipe-line from Alexandria. Food was also good, and the accumulated experience of quartermasters and cooks resulted in the supply of a ration that was adequate and palatable when it reached the men. Red Cross supplies were well organised by the representative being in the divisional area.

ORGANISATION OF MEDICAL UNITS

The methods of work of the medical units were determined to some extent by the need for maximum mobility. Orders were given that field ambulances going up with brigades should leave behind as many men and as much equipment as could justly be spared without sacrifice of efficiency. Accordingly as at the beginning of these operations, each field ambulance entered the forward area with its headquarters and one other company, with only a mobile section of the remaining company. Though shortage of transport was felt again, loans of vehicles from the A.A.S.C. did much to remedy deficiencies. The tactical need for rapid advance and consequently for great mobility lessened by August, when the second phase of action began.

It will be seen from the arrangements described above that two ambulances combined in handling the casualties during the earlier phases of the campaign. At this time the division had a front of two brigades. One field ambulance collected casualties from its brigade and ran a main dressing station which served the division. The other ambulances collected casualties from the other brigade and took them to the same M.D.S. Advanced dressing stations were few and rudimentary only: a minimum of surgical aid was given here, the aim being to transport the men to the main station as soon as possible. Usually the ambulance waggons could go right up to the advanced posts, and, as in the preliminary engagement the need for stretcher bearers was only slight. Waggons from the M.A.C. were working as far forward as a rearward advanced dressing station, since the medical unit itself did not possess enough vehicles of its own.

Sections of the "Friends' Ambulance Unit", a voluntary unpaid unit raised by the Quakers, were closely associated with the 9th Division. One driver, R. Palmer, and his vehicle, by reason of a breakdown in a vehicle of the 2/11th Field Ambulance, remained attached until the end of the battle in July, and collected casualties from advanced dressing stations, an unusual role for an M.A.C. car. Even in these early engagements the value of a mobile surgical team was apparent. Equipped more fully than before, and more independent, the team had the advantage of good lighting, and facilities for sterilising dressings on the spot. Hitherto surgeons working in forward areas had clamoured for a generator set and an autoclave: now, though not on the official equipment tables, these items were recognised as essential.

The wisdom of providing a divisional rest station early was evident. The organisation did not permit the use of any extra field ambulance as in the corps rest station set up in Syria, but by employing men who had not gone forward with field units (the "left out of battle" or "L.O.B." category) and adding officers of appropriate experience from field ambulances a most useful unit was produced.

August found both sides organising their forces for the forthcoming battle. Lieut-General B. L. Montgomery assumed command of the Eighth Army on 13th August. Tactically the position was unaltered, except that the new army commander had secured additional defence for the Alem el Halfa Ridge in the south, towards the escarpment leading into the Qattara Depression.

During this month the base and forward base medical organisations were perfected. In the forward areas a more aggressive policy reflected somewhat on medical arrangements. For example within a small fortress area formed on the railway line at Shammama Halt Major N. H. Morgan of "A" Company 2/11th Field Ambulance set up an underground A.D.S. with operating theatre, resuscitation and holding rooms. At the base the 2/7th A.G.H. lost no time after arriving at Buseili, and by the 27th August had 729 beds equipped and 422 of these occupied, while by the beginning of September expansion to 1,000 beds had begun. Some difficulty was experienced in accommodating convalescent and long-term patients, and at first transfers to the 2/6th A.G.H. in Gaza were necessary, but by 26th August the 2/4th Australian Convalescent Depot was established at Tolumbat, after some delay in securing a full water supply, and began to take patients. The 2/3rd Casualty Clearing Station was completing details of its ordnance equipment, including such important items as a generator set for lighting. Mobility of this unit was aimed at as far as possible: Steigrad did not wish the heavy section to be immobilised in a building while the light section was freely mobile. Decisions concerning details of the part to be played by this C.C.S. were deferred till the full scale action drew nearer. By the beginning of September arrangements for the full operation of the divisional rest station were complete. This was designed to take lightly wounded men who would only need up to two

weeks of institutional care, the mildly ill, and all men suffering from exhaustion states or the psychological effects of bombardment.

At the end of August a determined attack was launched by the *Afrika Corps* on the extreme south of the Alamein line. This thrust began after midnight on the 30th, and was reinforced by other holding attacks and raids in the central and northern parts of the line. Rommel had boasted of a speedy entry into Alexandria, but the initial successes of the *Afrika Corps* were not sustained, though the German armour turned north behind the British left flank. The deep defences provided by the troops disposed on the Alem el Halfa Ridge, together with harassing attacks by the British armour in the south were able to counter this assault, and on the afternoon of 3rd September the German armoured force began to retire with heavy losses. The 2nd New Zealand Division was also involved in this action. On the 7th the fighting ceased, with the Axis forces still holding the western edge of the minefields originally set by the British in the south. Without hazarding a counter-attack, the British forces resumed their re-organisation and re-equipment. Without question this was a British success, and the moral uplift to all the troops was great. The spirit of the Australians was high, their discipline was good, and the reinforcements coming forward were men of good type; many came from the 6th and 7th Divisions, held back by illness or other reasons from moving with their own units.

This action was a good test of the medical arrangements. The 2/8th Field Ambulance was strengthened by the surgical team from the 2/7th A.G.H., Major Giblin and Captain Berryman, the last mentioned being replaced a few weeks later by Captain H. I. Turnbull, and also by the remainder of its "B" Company which previously organised the rest station. The rest station was temporarily closed, the M.D.S. of the 2/11th Field Ambulance taking minor medical and surgical casualties. A little later, as the time approached for the big attack, a rearrangement of field ambulances was made, and the 2/3rd then took over the rest station, which was designed to hold up to 200 patients.

The main dressing station of the 2/8th Field Ambulance was accommodated east of El Alamein in E.P.I.P. tents, which here, as elsewhere in the Middle East, were found most satisfactory and versatile. A group of five tents accommodated the surgical teams, two were used as theatres, two for resuscitation, and one for sterilising. Two other brigaded tents provided dressing posts. In their location the unit made ready for action: ambulance pits were dug, and, following current policy, only a small advanced dressing station was set up. Small tents and tarpaulins provided other accommodation, and three marquees were kept ready for emergencies, for example even the possibility of the area being surrounded. During the action a fairly low level air attack damaged an ambulance vehicle and wounded both drivers, though the patients were unhurt and the waggon was successfully driven in. The arrangements worked well and prompt resuscitation and surgical treatment were carried out on wounded.



Walking wounded and members of the 2/11th Field Ambulance at A.D.S. El Alamein.

(W. G. Smith)



Underground operating theatre El Alamein.

(Australian War Memorial)

The 2/11th Field Ambulance had an M.D.S. in undulating sand dunes near a beach within the 26th Brigade fortress area. A resuscitation centre was provided in tents, and an Anderson iron shelter made a satisfactory theatre. Here the unit took stock and had a brief rest after a strenuous month. Medical stores were fairly satisfactory on the whole though some items could not be obtained. Thomas splints were still difficult to reclaim, repeating the similar experience in the earlier desert campaigns, through failure of base units to return or exchange splints. Two dental units, the 14th and 20th were stationed in this area and were kept continuously busy.

Rations were good, so too was water, provided at the rate of one gallon per day, with supplementary supplies for medical units. Some trouble was experienced in the water containers in the R.A.Ps. as they did not withstand much transport. It was observed that while the men had opportunity for sea bathing "desert sores" were few, though they still troubled others like the infantrymen, who had no such opportunities. During the busy period the men had worked well in all the forward medical units. Both the ambulance drivers and the orderlies showed courage, endurance and gentleness.

FINAL PREPARATIONS

During September advantage was taken of the lull in operations to consolidate the position. Medical stores were still not fully obtainable, but supplies were improving. Sites were picked for main and advanced dressing stations, and the light section of the 2/3rd C.C.S. was brought forward to assist in the treatment of casualties. The commander of the C.C.S. suggested that the heavy section should also be brought into the operational area so as to reinforce and expand the light section: to this the D.D.M.S., A.I.F. agreed. The plan was that the light section should come forward to an administrative area without any sign that it was a medical unit. From there it was to infiltrate the area then occupied by the 2/11th Field Ambulance leaving the tentage undisturbed till the eve of the coming battle, and moving vehicles as little as possible. The 2/11th Ambulance began work on a new M.D.S. in partly finished underground rooms north of the main road at El Alamein, and as the C.C.S. light section moved in unobtrusively to the old M.D.S., the ambulance unit occupied the new site, moving small detachments only at a time, chiefly by night. No red cross ground signs were displayed. Further concealment was gained by leaving a certain number of trucks in neighbouring areas by day.

Efforts were made in general to remedy existing faults and shortages. As far as possible lighting sets and autoclaves were supplied for surgical work. Shortages of such equipment were difficult to overcome, for the actual materials could not be obtained except in small quantities, but it is difficult to understand why so much delay occurred in placing these items on the official equipment lists. Some of the tents supplied were unsuitable. By the middle of summer it was obvious that khaki coloured marquees had lost their light proof value; E.P.I.P. tents were found much better, though they had the drawback of added weight; R.D. tents were

found of little value for any purpose. There was of course still a shortage of vehicles and even increased establishments were found insufficient. Such necessary appliances as kerosene stoves of "Primus" type were never sufficient in number. Their value was so great that every opportunity was taken to obtain them from the Red Cross or any other source. Spare parts were also scarce, and had a supply been available delay and inconvenience could often have been saved.

By the time October had come the British forces were far advanced in plans for a major battle at the next full moon, at the end of the third week of the month. High level orders for the battle of El Alamein were drawn up early in October and on the 19th explained by General Montgomery to every commander down to the rank of lieutenant-colonel. All army units realised the necessity for perfect organisation; this was completely understood by all ranks, to whom the plan of battle was explained just before the action. The cover plan demanded also a high degree of secrecy of movement in order that concealment of purpose should be achieved, particularly in the placing and timing of the main thrust.

The medical services in their own field had to provide for sufficient mobility and elasticity, balance of reserves without wastage, and adequate handling and transport of casualties. The Commander-in-Chief predicted that the action would present three phases, "the break in, the dog fight, and the break out and pursuit". This gave the keynote of all the preparations.

The disposition of the medical units for the battle were as follows. The 2/3rd Australian Field Ambulance expanded the D.R.S. at El Hammam to 240 beds and was prepared to receive the lightly sick or wounded patients, or those of the neurological type, and retain them up to two weeks. Even in the less forward areas the daily risks were emphasised by the blowing up of Lieut-Colonel Mugford's car on an unsuspected mine-field, fortunately without casualties. Captain Barry and two theatre orderlies were lent to the M.D.S. of the 2/8th Field Ambulance. In accordance with the need for mobility one company of the unit was kept "on wheels" ready to move. It will be seen that as in the first desert campaign the principle was followed of the field ambulances being used in accordance with need and efficiency, and if necessary subjected to a process of fission.

The 2/8th Field Ambulance had Lieut-Colonel Hanson once more in command, after relieving as A.D.M.S. Colonel Furnell who had been ill. The sites occupied by this unit remained unaltered, but in accordance with the tactics of deception of the enemy, the necessary changes in forward posts were not made till after dark on the eve of battle. More ambulances were brought up and lorries for walking wounded, who were to be collected at a divisional medical post controlled by the transport officer of the 2/3rd Field Ambulance. Other lorries were provided for taking men to the rest station. Additional vehicles were ready in the care of a small detachment in the 24th Brigade Group. Majors S. L. Seymour and V. Bulteau looked after evacuation arrangements from the 20th Brigade, with the necessary assistance of bearers and transport. Two stretcher

bearers were also placed with each regimental medical officer as guides. The advanced dressing station was not a conventional dressing station, but reduced to its simplest terms as a collection point with several slit trenches. The 2/13th Field Company marked the tracks to the R.A.P., making the way easy to find, though it was noted later by some drivers that a road could be readily lost, especially at night, when the dust and smoke obscured even the light of a full moon.

The 2/11th Field Ambulance had moved up to its new M.D.S. on the coast, near Abiar el Shammama and with its "B" Company opened an A.D.S. near which was an ambulance car park, with vehicles pooled from all field ambulances. A surgical team, Major R. N. Howard and Captain A. J. Kennedy, with five men, was attached, with its own transport and equipment. The light section of the 2/3rd C.C.S. went forward to the old site of the M.D.S. of the 2/11th Field Ambulance to take part in the surgical work there, and final arrangements were being made for the disposal of the heavy section.

As the time set for the battle of El Alamein approached all medical arrangements were concluded, certain connecting links being left until the last. The field units made their necessary exchanges cautiously and with stealth. Manoeuvres involving the collection of vehicles in parks or in shifting equipment were done with all practicable concealment. At the other end of the chain the base hospitals and a convalescent depot were now well settled in and expanding their resources. There remained the heavy section of the 2/3rd C.C.S. Arrangements were made to set it up at the eastern end of the medical concentration area, Gharbanayat, under the control of the D.D.M.S. Eighth Army. Fourteen 3-ton lorries were needed to transport the material and equipment. The move was made without display of red cross emblems and after some delays from a dust storm and a heavy air raid, the unit reached the area safely and promptly began to make the necessary excavations and to site and pitch tents. With the help of a Mauritius labour corps the work was completed only just in time for the beginning of the action. As soon as accommodation was ready nurses were sent up to work at this advanced base, where they arrived on 21st October, while the concrete was being laid for the theatre floor. Some difficulties of administration of this unit were apparent, since its two sections were in different areas and under separate commands. The light section's constitution did not permit it to act as an M.D.S. but it was placed under 9th Division A.I.F. for administration, and the D.D.M.S. XXX Corps promised that its services would not be overtaxed. On the eve of the battle an arrangement was made for each C.C.S. in turn, including the heavy section of the Australian C.C.S., to receive 150 patients, so as to give time for dealing with admissions. The 2/4th Field Hygiene Section was attached to the 2/3rd C.C.S. light section for general duties.

Conferences were held with the commanders of the New Zealand C.C.S. and other units as to the times and methods of evacuation of casualties. It was arranged that all A.I.F., Greek and French wounded, and all those

with facio-maxillary wounds should be sent by road to Alexandria. The plastic surgery was done in No. 1 Facio-maxillary Unit in a general hospital in Alexandria under the care of Major D. Officer Brown, A.I.F. who was on loan as surgeon in charge. Others were sent to Cairo. Air transport from the medical concentration area to Buseili was also discussed, particularly the possibility of using an airstrip close to the hospital site. Transport from Egypt to Palestine was also organised by land and sea, and in emergency by air.

It was of course essential that during heavy attacks a smooth flow of casualties be ensured, so that no surgical team should be overloaded, and none left without occupation. The plan revolved round the check post established at the roadside at a point about eight miles west of El Alamein railway station. This was manned continuously by the D.A.D.M.S., Major Peters, his assistant, Captain M. R. Gold and an N.C.O. The chief car park for ambulance cars and lorries for walking wounded was close by, separated in fact by a minefield. Movement of casualties was directed solely by Peters or Gold, who had a telephone to the A.D.M.S. at divisional headquarters and to the car park. A car replacement was promptly sent forward as each loaded vehicle passed towards the M.D.S., and empty vehicles returned as soon as possible from the M.D.S. to the car park, where they received any necessary maintenance and the drivers were fed and rested. Sometimes it was advisable to leave severely wounded men at the 2/11th M.D.S., rather than expose them to the eight miles longer journey to the C.C.S. This check was useful for communications also, and the A.D.M.S. who could use it as a sort of tactical headquarters through which messages could be promptly sent. If any M.D.S. became unduly crowded casualties could be diverted to another by ringing the check post. Before the battle began detailed arrangements were made for transport vehicles for wounded. All the thirty-two ambulance waggons belonging to the division were pooled. Of these five motor ambulances served the 24th Brigade on the coast, running to the 2/8th Field Ambulance, M.D.S., and two were left at the rest station for use by the 2/3rd Field Ambulance. The remainder were devoted to general use forward. Arrangements were made for each field regiment and each battalion of the 24th Brigade on the coast to provide a 30-cwt. or 3-ton lorry for walking wounded. These vehicles did not enter the car parks. In addition, each field ambulance supplied eight lorries for similar purposes, all equipped with blankets and two stretchers, and each with an orderly. The drivers of the ambulances and lorries had their meals at the main car parks, where they also had such sleep as circumstances permitted. Modified advanced dressing stations were established during the battle as need arose.

THE ATTACK AND BREAK IN

The attack began before midnight at 2140 hours on the night 23rd/24th October, and after the severe preliminary barrage infantry units were engaged. The early casualties came back promptly; though some of those

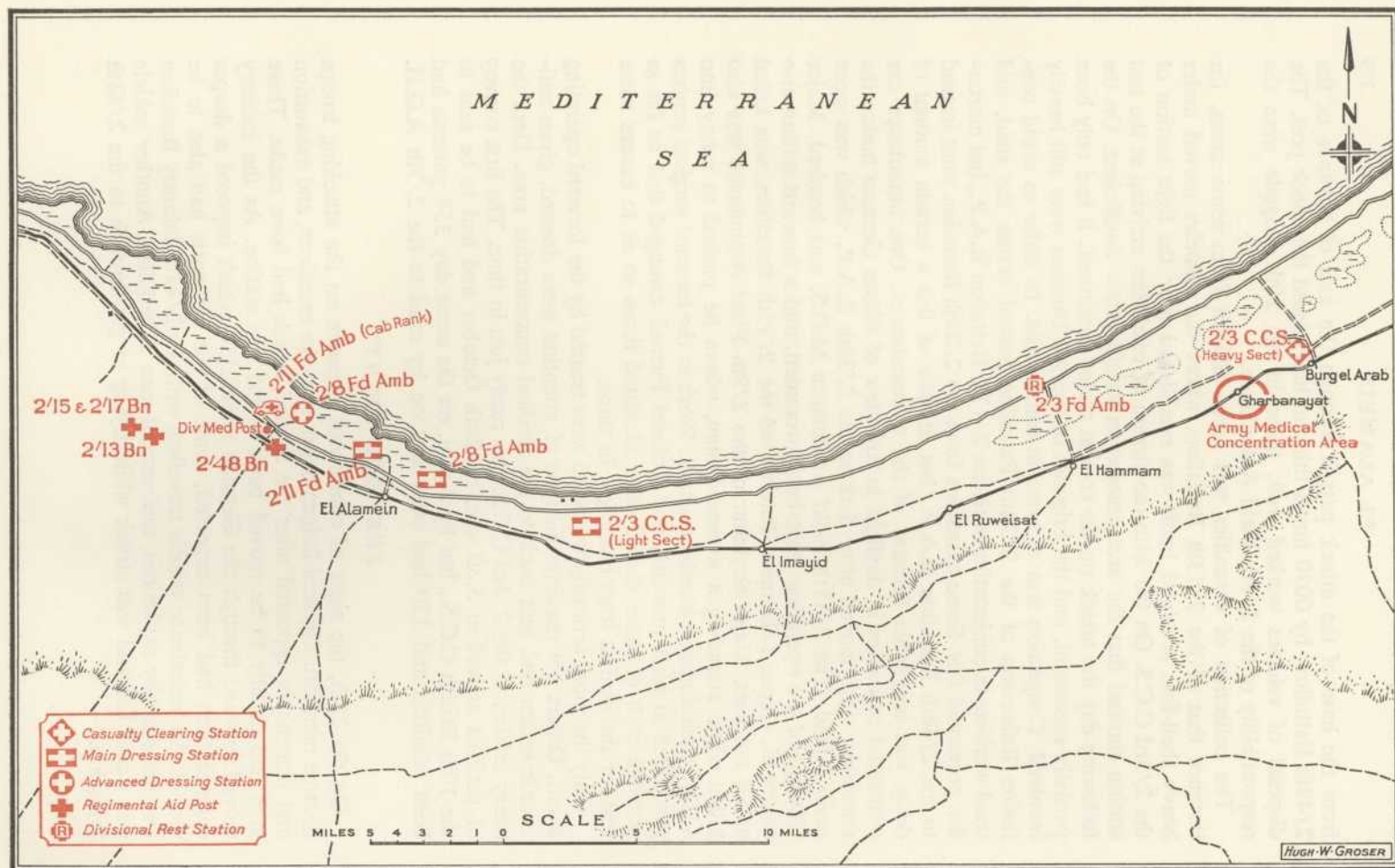
from the base of the attack passed through the axis of advance of the 2/48th Battalion, by 0030 hours thirteen had passed the check post. The disposal of vehicles worked well; those in the 20th Brigade were the responsibility of the 2/8th Field Ambulance.

The collection of casualties was more difficult from some areas, for instance that of the 2/13th Battalion, where the vehicles moved under heavy shell-fire. A blood bank was established near the light section of the 2/3rd C.C.S. On the 24th the stream of casualties arriving at the rest station showed that the accommodation would prove insufficient. On the following day the attack on the coastal sector continued: it had only been partially successful, and the brigades of the 9th Division were still heavily involved. Congestion was extreme in some areas. In order to avoid confusion Robertson of the 2/24th Battalion moved across the road, and tried working in conjunction with the 2/17th Battalion R.A.P., but mortar-fire prevented this. Some casualties from the 2/24th Battalion went instead to the 2/48th Battalion R.A.P., but in spite of this a certain amount of delay was inevitable because of the circumstances. One ambulance car evacuated casualties in daylight in full view of fifteen German tanks: the remainder were moved after dark to the 2/24th R.A.P. which was more easily found. The 2/11th Field Ambulance M.D.S. was bombed, Major Howard of the operating team being wounded, and a forward station also damaged. Captain Samuels, R.M.O. of the 2/15th Battalion, was killed at his aid post. Major Seymour of the 2/8th Field Ambulance was also killed while attending a wounded man, whom he pushed to safety into a slit trench during a bombing attack. Work in the forward surgical centres proceeded at high pressure, and Colonel Furnell arranged that as far as possible each of these should close at stated times so as to ensure some rest for the staff at least one night in three.

Only the more seriously wounded were treated by the forward operating teams. Others not needing this type of attention were dressed, given anti-tetanic serum and sent back to the medical concentration area. Here the heavy section of the 2/3rd C.C.S. was ready just in time. The first convoy of patients arrived at 5.30 a.m. on 24th October and had to be sent to the 10th British C.C.S., but by 3 p.m. on the same day 354 patients had been admitted and 120 had been sent on by road to the 2/7th A.G.H.

THE "DOG FIGHT"

On the 26th, the signs of continuous pressure on the attacking troops became manifest. Physical fatigue began to make exactions, and exhaustion and fear states appeared after the second attack had been made. These men had usually to be moved back to the rest station. As the infantry moved forward through the German minefields, which imposed a deeper defence than had been expected, some of the aid posts had also to be moved. An ambulance vehicle travelling with the 2/48th Infantry Battalion was damaged by explosions, and several men were killed. Another vehicle was under fire and was struck while trying to get through to the 2/48th Battalion.



El Alamein, 24th October, 1942.

By this time the momentum of the attack was diminishing. The Australian troops had made considerable advances in the northern sector and the men were tired after three days and nights of action. German anti-tank defences and heavy counter-attacks held up the advance. On 27th and 28th October a regrouping of forces took place. This involved the 9th Division in an assault on the coastal salient of the Axis forces and was designed as a necessary preliminary for the hoped for break-through of the XXX Corps, followed by engagement of the British armour farther to the south. A counter-attack by Rommel was frustrated by heavy bombing by the Desert Air Force.

The strain on the troops was reflected in the medical units. Blood plasma and serum were running short, and suggestions were made for supply of blood from members of the A.I.F. in Palestine. At the forward section of the 2/3rd C.C.S. the high proportion of seriously wounded made post-operative nursing a heavy responsibility. Furnell had found it advisable to extend the scope of this light section and had built it up with extra officers and men till it could function as a main dressing station. As it consisted of an operation team and an officer for resuscitation and anaesthetics with nursing orderlies it would have been ideally attached to an M.D.S. in the ordinary way. It was not as self-contained as its name suggested, and came in rather late for other disposition. In addition, there was no available room at the 2/11th M.D.S., and the 2/8th M.D.S. was near a salt marsh which might have been an obstacle to traffic in case of rain. Help was given to the 2/8th Field Ambulance both in an advanced dressing station and the main dressing station by attachments from the 7th British Light Field Ambulance. Vehicles were finding difficulty in movement on some of the tracks, as the forces went forward, and the rank of ambulance cars was exposed with no efficient cover. The divisional rest station was working practically to capacity and found it difficult to cope with the stream of lightly sick and wounded and the men with exhaustion states. The need for psychiatric guidance was felt at this time, for although Major A. Stoller had been detailed to study the problems at the 2/1st Australian Convalescent Depot, the staff of the rest station realised that treatment of many of these men would be much more effective if undertaken promptly in a forward area.

THE BREAK OUT

On the night of the 28th/29th October the 9th Division began an attack which was hoped to be a prelude to the break-through. Against strong opposition the Australians drove a narrow wedge through the extensive minefields. This ground was held in spite of strong counter-attacks. An advanced post of the 2/8th Field Ambulance was discovered to be on a minefield only by the blowing up of a vehicle. The dressing station was therefore moved to a more appropriate site on "diamond track". The R.A.P. of the 2/23rd Battalion could not be reached except through fixed machine-gun fire and by day vehicles could only safely be left at the aid post of the 2/13th Battalion. Transport conditions were in fact most

difficult everywhere. All roads were jammed with tight masses of traffic, the dirt surfaces were cut up badly, and heavy clouds of dust obscured vision. This congestion made it difficult to reach and remove the large numbers of wounded who suffered chiefly from the heavy shell and mortar-fire, and the shelling of sites of R.A.Ps. accentuated this problem. In preparation for further movement forward the remainder of "A" Company of 2/3rd Field Ambulance went up to the 2/3rd C.C.S. light section.

The next day the roads were freer and wounded were brought back more easily, but as the division pressed its attack northwards the movement of wounded was again difficult. The attack was successful in penetrating beyond the coast road, but did not reach as far as the sea. This action cost many casualties. The R.M.Os. were somewhat hampered in their work at the R.A.Ps. on account of the great congestion. On occasion the halting or turning of a battalion's line of advance increased these difficulties and casualties were not always met by their own medical officer. Such movements also interfered with prompt evacuation of wounded at times. On the 31st wounded could be safely sent away in daylight from the 2/32nd Battalion aid post at the "blockhouse", north of the railway, although the movement was under direct observation of the enemy. Two of the tired battalions were relieved by others.

The "blockhouse" was a railway building of six rooms between the railway stations at Tel el Eisa and Sidi Rahman. It was captured by the 2/32nd Battalion and was found to be occupied by three German medical officers with orderlies and some wounded Germans. The R.M.O. of the battalion, Captain W. Campbell set up his R.A.P. there, and Captain Grice settled his section of the 2/11th Field Ambulance there also, and a kind of international medical post was established with two Australian and two German medical officers working together. The German forces did not attack it, but fired on vehicles approaching it in daylight, though a German ambulance brought back one Australian and five German casualties the next day. Later this area was stabilised, and the German personnel were brought back to the 2/11th M.D.S. to help with their own casualties, but as they showed discrimination against their Italian allies they were sent to join other prisoners. The "blockhouse" was used as an A.D.S. later, but on 31st October and 1st November it was in a dangerous area, as appeared when a walking wounded lorry was blown up on "diamond track", and Captain J. F. Sullivan R.M.O. of the 2/17th Battalion was wounded.

The divisional rest station was kept very busy, and the strain imposed by psychiatric casualties was such that Mugford of the 2/3rd Field Ambulance asked for skilled assistance. The surgical teams and staffs of main dressing stations continued to work at high pressure, and a steady flow of patients proceeded thence to the medical concentration area and so on to Buseili and Gaza. On the 2nd, shelling of the area which surrounded the 2/17th Battalion R.A.P. was continuous, and the patients were moved from the "blockhouse".

Meanwhile the battle tactics had been altered to take advantage of the opportunity of a break-through farther south. Here the 2nd N.Z. Division and armoured brigades established a new corridor through Axis lines. Strong anti-tank screens used by Rommel held up further armoured advances by Montgomery's forces but increased Axis traffic on the coastal road showed that the enemy were extricating themselves, and that the break-through was almost complete.

FINAL TASKS FOR THE 9TH DIVISION

On 4th November the British forces were in pursuit. Strong resistance in places still had to be overcome, and shelling made the main road unusable for routine evacuation of wounded. The M.D.S. of the 2/8th Field Ambulance was now virtually closed except for local sick, but the nursing orderlies attached with the operating team were still very busy caring for patients recently operated on, and were therefore not free for movement. Men with exhaustion and fear states were still coming in, but Major Stoller, detached from the 2/6th A.G.H. was working as a psychiatrist at the 2/3rd Field Ambulance Rest Centre. For the first time in the war an Australian psychiatric first aid post was established at the front line. Over 100 patients passed through Stoller's hands, and only a very few of these had to be passed on to the 2/7th Hospital. A little later he saw some of these patients when they appeared before a medical board, and saw several others still later at the 2/6th A.G.H. The follow-up thus made showed that very few of the men treated in forward areas continued to have severe psychiatric symptoms, and corroborated the value of early treatment and disposal. It has been previously pointed out that medical officers who saw psychiatric patients in forward areas both in Tobruk and Alamein felt that the plan followed in Tobruk in recording the diagnosis of "fear state", when this was justified was fair to all parties.

Movement of wounded by the main road was possible by the 5th, and on the following day the general situation was such that the 9th Division could be allowed to rest and then to refit. By the 8th the phase of pursuit of the enemy had begun. Operations were hampered by a heavy fall of rain which prevented movement of the armoured vehicles, and thus the complete disintegration of the Axis forces in the area was impossible. The 2/8th Field Ambulance and 2/4th Field Hygiene Section were placed under command of the 20th Infantry Brigade in case this force was used in the pursuit. The light section of the 2/3rd C.C.S. had transport troubles, as the M.A.C. cars had been withdrawn, but the next day obtained an extra lorry and was then able to move the remainder of its equipment. This C.C.S. was the only Australian medical unit to advance beyond Alamein, reaching the neighbourhood of Matruh; the heavy section moved from El Hammam in the wake of the victorious Eighth Army, and set up a hospital and staging post at Garawla. The nurses were brought forward with the N.Z. nurses, and though the swiftness of the German retreat limited the activities of the unit, useful work was done in the area. Further

movement westward was planned, but this was cancelled and on 9th December the unit began its move back to Palestine.

By the middle of November the tasks remaining for the medical services of the 9th Division were no longer of the high intensity demanded during the battle. The division now came under the command of the XIII Corps, and the field medical units carried out the normal maintenance medical work. By the 14th the surgical team from the 2/7th A.G.H. was no longer required, and had returned to its parent unit. The 2/3rd Field Ambulance still continued to run the divisional rest station and by the middle of November the 2/8th Field Ambulance was ready to move, while the 2/11th Field Ambulance acted as a giant aid post for various units in the area. Once again diarrhoeal diseases became prevalent, no doubt spread by troop movements and by the occupation of areas vacated by retreating enemy troops. Flies were swarming in millions. The hygiene of the battlefield area was of a low order; a number of dead bodies were still not buried, a task left to others while pursued and pursuers took the long road to El Agheila. On 29th November the headquarters of the 9th Division moved back to Palestine.

MEDICAL REVIEW OF THE CAMPAIGN

It is now opportune to review the general health of the troops during their periods of preparation and action in the desert. Diarrhoeal diseases were common soon after the arrival of the division, as may be seen from the figures for the twelve weeks ending 3rd October. During this period there were 1,253 cases of these infections out of a total of 3,976 medical casualties. This figure may be compared with 844 for minor infections of the skin and areolar tissue, 750 pyrexia of unknown origin, and 465 mild respiratory infections. The number of obscure pyrexias really expressed the impossibility of achieving a final diagnosis in the divisional area. Some of these may have been infective hepatitis, of which 243 cases were seen. The experience of the New Zealand division is much more enlightening here, as this force suffered heavily from hepatitis, and its medical officers produced strong epidemiological evidence of the intestinal origin of this disease. The long period of convalescence necessary after a severe attack of infective jaundice caused considerable loss to the force. Colonel Furnell, A.D.M.S., and Lieut-Colonel Lempriere, commander of the 2/11th Field Ambulance, were among the victims. Since it is now known positively that this is a sanitation disease, it is permissible to include it with the diarrhoeal group from the hygienist's point of view; these combined groups then represent 40 per cent of the medical diseases affecting the Australian force for the period of three months ending 3rd October.

In his quarterly report, the A.D.M.S. commented that great disappointment was felt in the early summer months that the lessons of sanitation seemed to have been little regarded; though this was largely owing to the constant need for mobility there was really a breaking down of a previously high standard. Later on, the workshop of the 2/4th Field

Hygiene Section under Major Fryberg gave great help in providing fly-traps, safes and superstructures for latrines. At an earlier period carrying about such fittings was unpracticable, and wood was an unknown commodity to most units in the desert. These preventive measures and the natural decline in fly population in the ensuing hot months helped to limit the losses due to these diseases. It was noticeable that when more active measures could be taken to prevent fly breeding and to exact a high sanitary standard the numbers of bowel-borne disease decreased. Other useful measures were the holding of classes in military procedures and hygiene for medical officers who had not had previous experience, and even more valuable, the provision of hygiene inspectors who lived with the units. The constant efforts put forward did much to keep the fighting force at a good general level of fitness.

The water supply, as above mentioned, was good throughout. In order to conserve the piped supply from Alexandria, local supplies were drawn upon as far as possible. The engineering feat of keeping a constant supply was notable especially in the turmoil of the engagement with its varying needs and movements.

Malaria was not a serious problem, most of the clinical infections were of extrinsic origin. A sharp outbreak attacked a battalion after exposure to infection in Syria. The risk here was unusual as mosquitoes in deep caves bit during the daytime, and the suppressive measures were not sufficient to control overt infection. Men in other units had occasional relapses of benign tertian malaria, and a few cases of local infection occurred. Attention was drawn to the malarial potentialities of the area where the 2/3rd C.C.S. was sited for a time in the Nile Delta, where a few cases of malaria emphasised the need for care. During the preparatory period two plagues of mosquitoes visited the force, apparently borne on easterly winds from the delta, where was the habitat of this species *Anopheles pharoensis*. A slight increase of primary malaria was thought by some to follow this visitation, but no serious results ensued, as fortunately this mosquito is not an efficient vector.

At the end of the 9th Division's service in the Alamein sector general health was good, but dysentery and diarrhoea were again prevalent even to the end of November. Flies increased in numbers and were difficult to control as they were carried eastward by returning troops. The same applied to superficial septic sores. Pharyngeal infections were again common at this time. One curious feature was the prevalence of flatulent dyspepsia, but this was but a passing phase, and on return to Australia the men soon regained their usual fitness.

It is appropriate now to review the medical affairs of the whole action and see what generalisations may be made and what lessons may be drawn from this hard fought battle. In the fighting line the work done by the R.M.Os. and stretcher bearers was splendid. It was sometimes necessary for the bearers to concentrate on moving the wounded, and to reduce first aid dressings to the necessary minimum. R.A.Ps. were not always useful in proportion to their size or convenience, the problem was to

bring the men there. Some medical officers suggested as the result of their experience that stretchers be supplied to walking wounded trucks and fitted in carriers. The stretcher bearers often ran great personal risks as the casualties in some units showed. Their numbers were sometimes inadequate. Captain Goode of the 2/13th Battalion pointed out that ten to fifteen bearers have had to cope with 100 casualties in some operations. Captain Samuels of the 2/15th Battalion had to train six more men in September owing to heavy losses in the previous action.

The figures given for the Australian casualties during the period of heavy fighting which began on 23rd October were 449 killed, 2,032 wounded and 222 missing. Though opposed to Italians troops in the early part of the engagement the Australians fought against the Germans for most of the period. The disposal of casualties in the various actions provided that ordinary sick and slightly wounded men would be sent straight through from the M.D.S. without admission, and taken to the D.R.S. after receiving any necessary temporary treatment. The "N.Y.D.N." psychiatric casualties were also sent to the D.R.S. but not past this unless by instruction of the A.D.M.S. The main dressing stations and the light section of the 2/3rd C.C.S. were cleared by motor ambulance convoy vehicles to the concentration area at Burg el Arab. In general these routines were followed, with specific additions and modifications during the final engagements as already described.

SURGICAL WORK

After the action, Furnell concluded that the arrangements had worked satisfactorily, ensuring surgical treatment to wounded in a minimum of time without holding up their movement. The D.D.M.S., A.I.F. in the Middle East reported to Australia as follows:

The work of our units was splendid. The medical arms of the Eighth Army made it possible for A.I.F. to be cleared from the front, resuscitated and treated in forward units and admitted to A.G.Hs. with great expedition. The blood service was excellent and medical equipment was in ready supply. The No. 1 Australian Air Ambulance Unit was used for the evacuation of sick cases from Burg el Arab to Buseili.

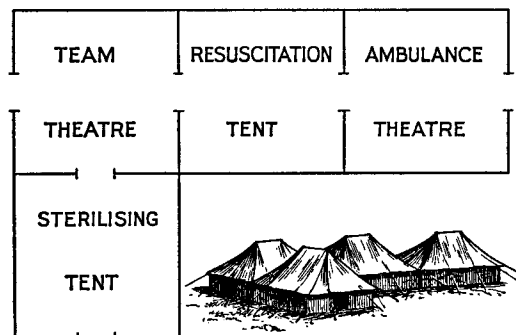
From 24th October to 7th November 1942, 430 operations were performed in main dressing stations by attached operating teams, and 229 by surgeons on the staff of field ambulances. In this total of 659 there were 119 abdominal wounds treated, 218 compound fractures, 18 wounds of the chest, 38 amputations were performed and 276 excisions of wounds without other procedures. In all, from 1st July to 30th November 1942, 9,147 sick were admitted to main dressing stations of the 9th Division of whom 7,991 were Australians, and 4,678 battle casualties, of whom 3,644 were Australians.

Resuscitation was extensively used. A small percentage of wounded men needed only warmth, rest and morphia, some 10 to 15 per cent of the remainder required transfusion of blood or serum. Wet serum sent from the Commonwealth Serum Laboratories in Australia arrived in

excellent condition, with very slight amounts of denatured protein, and no faults developed in the bottle assemblies. A notable feature of the forward surgical treatment during these actions in the Western Desert was the extent to which blood transfusion was used. The Australian giving and taking sets again proved efficient and their adequate size was a convenience. Taking blood on the spot was not always practicable, as it absorbed the special attention of medical officers who were already busy. Further, the proportion of lightly wounded men was smaller in these engagements, and the quantity of blood called for was greater. For instance, during the Alamein battle, in one period of twenty-four hours in the 2/11th M.D.S. 80 pints of blood were given, and as many as seventeen transfusions proceeded simultaneously during one period of action. During the latter part of the fighting the British overseas pattern of blood transfusion equipment was used exclusively, the blood being obtained from a forward blood bank. Large amounts of serum and plasma were also used. Lavish transfusions often saved lives and the value of a skilled medical officer to take charge of all resuscitation was proved. He could decide priority of need for blood, which to some extent decided priority for operation, subject to the surgeon's opinion. Lieut-Colonel Buttle, R.A.M.C., in charge of the British blood bank, was most helpful in advice and in securing adequate supplies of blood and blood fluids. The British giving sets were very satisfactory, but the filters and rubbers needed renewal frequently, and blockage tended to occur after about two pints had been given. Rapid transfusion was found necessary in many instances. It was often found convenient to use the intravenous needle for anaesthesia also, it was left *in situ* after the pre-operative infusions and "Pentothal" administered through it. No severe reactions were encountered but numbers of patients had a mild rigor, probably due to a rapid rate of administration. Mild jaundice was sometimes noted at the hospitals; this was apparently harmless, but Lieut-Colonel F. J. Clark at the 2/7th Hospital observed that jaundiced patients frequently had persistent oozing from raw surfaces. The occasional observation of anuria in severely wounded men should also be mentioned.

The most convenient arrangement of a tented M.D.S. was found to conform to the general pattern shown in the diagram. E.P.I.P. tents were found to be the most suitable and even when "dug in" were comfortable and secure.

It is of interest to examine the forward surgical work from the view point of the general hospital



Tented M.D.S. as used at El Alamein.

where the patients were received. The 2/7th A.G.H. at Buseili sent on 533 casualties after treatment to the 2/6th A.G.H. at Gaza by road, and six by air. Three hundred and ninety-one were transferred to the convalescent depot; fourteen to a staging camp and at the end of November 395 were still in hospital. Special attention should be drawn to the small death rate: of all the wounded arriving after forward treatment only five died. Colonel Hayden at the 2/7th A.G.H. found that air transport was very satisfactory: the choice of individual patients was on the whole apt, and the men arrived comfortably and promptly.

Sulphanilamide was used as a routine in wounds, but even at this date it is interesting to note that some instructions were taken literally. A blue and red sulphanilamide card was used for recording the dosage of the drug used: this stated that 10 grammes of powder should be applied to the wound. This was interpreted by some to mean that this quantity should be introduced into every wound, a feat requiring some ingenuity at times. The moral probably lies in the need for unequivocal wording of all instructions.

The handling of men with fractures of the femur was much facilitated by the general use of some form of the "Tobruk plaster", which gave good immobilisation. By contrast, the poor immobilisation of fractures of the humerus caused much pain to most men and increased shock. The fixation of the upper arm is difficult, of course, but it cannot be said that attempts to rely on the "U" plaster recommended in "Notes of battle casualties from the fighting in September 1942", were at all successful. The best solution was to hold the man long enough for a plaster to be applied in the sitting position, which could only be done a few days after he had recovered from shock and preliminary excision.

Men with injuries of the chest and the abdomen did not travel well, owing to the adoption of the lying position. One important lesson of this action was the need, previously recognised and voiced by surgeons, for facilities for using the Fowler position during transport of wounded in ambulances. The greater facilities for early and thorough treatment of abdominal wounds, and to some extent too the adoption of exteriorisation in treating wounds of the colon, gave results better than any hitherto in the A.I.F. for battle surgery. Experience with chest wounds also yielded improved results. An appreciable number of injuries of the spinal cord and *cauda equina*, were seen. In three of six early cases of compression of the cord good results followed laminectomy. Infection of wounds was not serious or widespread; only four men suffered from gas infection and two of these died. Injuries of the eye were as a rule treated in base areas. The ophthalmologist at the 2/7th A.G.H. stressed the unsuitability of forward areas for ophthalmic surgery. Massive doses of sulphanilamide were advised while the patient was *en route* to hospital. Intra-ocular haemorrhages were by no means rare, though external signs of damage were often minimal.

Dental units and teams attached to a brigade or a field ambulance according to circumstances, did good work in maintaining oral health

whenever the military situation permitted it. By this time the general dental health of the A.I.F. was good on the whole, and most of the work was maintenance. This was continued throughout the preparatory periods and resumed as soon as possible after action. Dental officers sometimes found it possible to work in reasonable comfort under a canopy spread across a vehicle, using one side for a surgery and the other for a work room. At the 2/4th Australian Convalescent Depot a dental centre was established by the 3rd Dental Unit on 20th September, and there over 1,000 men were examined.

The convalescent depot was conveniently situated at Tolumbat where by 3rd September 575 patients were accommodated. An officers' wing was opened also. In order to maintain adequate feeding of the men rations were overdrawn at first until with regular discharge rate any adverse balance could be corrected. It was noticed that most of the men coming from the desert had enormous appetites, and it was difficult to supply enough potatoes and other vegetables.

The divisional rest station proved most valuable, saving strain on transport and on other units and economising manpower. Though the appointment of a psychiatrist for front line work was rather late in materialising, its value was undoubted. The notion that only severe psychiatric casualties are really urgent was proved short sighted: prompt readjustment was effected in numbers of men who were handled early and were thus not confirmed as neurotics by being sent back to a base.

The functions and disposal of a casualty clearing station once more aroused some discussion. The commander of the 2/3rd Australian C.C.S. pointed out that this unit was particularly experienced, both in technical procedures and in packing and moving. It was organised on the basis of a mobile unit, with a heavy and light section. The light section was designed to be fully mobile, and to take fifty patients in a forward position, handling battle casualties soon after injury. This calls for at least two surgeons capable of dealing with severe injuries, including those of the chest and the abdomen and compound fractures. The disposal of head injuries would depend upon the facilities available in the area. Experience in action showed that it is best that only preliminary treatment should be given forward, the patients being then sent back to a unit equipped for neurosurgical work. With the addition of a resuscitation officer and an anaesthetist the light section could be attached to an M.D.S. Experience during this action led the A.D.M.S. to attach such staff to the light section as would bring it up to the personnel standards of an M.D.S., thus making it self-supporting. Circumstances at the time did not permit of any other course being taken. The heavy section was prepared to hold at least 200 patients, acting like the light section as an evacuating unit. It will be noted that the unit as a whole fulfilled two functions, that of a more or less self-contained forward operating unit and that of a true clearing station with surgical facilities. The trend of thought, whether consciously or not, seems to have been towards the idea of a forward mobile surgical unit with some provision for holding patients for post-operative treatment,

so as not to hinder the M.D.S., the surgical spearhead of the unit, from moving on with an advancing force.

Furnell expected that some difficulties would arise, and in his report on the medical aspects of the action recounted some of the lessons learnt as follows:

The attack was to be in a new direction and from country not occupied by the division before D minus 1 Day. The distance from the final objective to the nearest M.D.S. was 20 kilometres.

An exposed right flank would be left from which it was expected that the enemy would harass the routes of evacuation.

The move forward of the whole of X Corps (Armd) would bring enormous masses of transport and it was anticipated that congestion would be severe.

The usual difficulty of liaison officer with the R.M.Os. was expected to be increased. The R.M.O. did not know when he would be called forward, or how far. All battalions started from lying-up positions in which they had hidden the whole of the previous day.

In the later phases, with changes in the direction of attacks and changes in brigade areas, and intra-divisional reliefs, these problems were intensified.

The method used to attempt to solve the above problems was:

(a) Attachment of four field ambulance bearers to each R.M.O. before the battle. Their primary function was to act as guides; the R.M.O. was instructed to leave a bearer at the original R.A.P. site and drop another at any point on his advance which might present difficulty for following people to find him.

(b) Two vehicles—either two motor ambulances or one motor ambulance and one W.W. lorry—were attached to each infantry R.M.O. before his battalion moved to its assembly area. He was to call these forward when his unit's echelon vehicles moved forward—that is, after dark on the night between D minus 1 and D Day.

R.M.Os. were assured that field ambulance personnel would follow behind them as soon as the advance started and behind the battalion and so comb the area for any casualties which unit stretcher bearers might not have been able to collect. Each field ambulance used one or more bearer officers¹ and the remaining S.Bs. of a company to do this.

Once the battle was on, liaison depended on frequent visits to R.A.Ps. by field ambulance officers. This duty was carried out in spite of frequent heavy fire from guns, mortars and machine-guns and contact throughout was good.

LESSONS

(a) It was proved possible to evacuate casualties from a difficult and dangerous area, over bad going, so that high grade surgical attention was available early enough to be effective. The light section of 2/3rd Australian C.C.S. (6 miles further from the front than was 2/11th Australian Field Ambulance M.D.S.) reports that the average time between wounding and arrival at light section was 6½ hours. This applies only to cases operated on, as times were not carefully checked for others; but it should apply equally to all their patients.

(b) Classical A.D.Ss. are unnecessary in a battle such as this. The establishment of more A.D.Ss. and the examination of patients in them would have been definitely harmful, by delaying admission to M.D.S.

(c) Surgical teams as provided for this battle are so valuable that they should always be available in a campaign.

(d) The old W.E. of eight motor ambulances in a field ambulance is hopelessly inadequate. Fourteen should be provided. Even with eleven, as was the case here, the drivers were all close to exhaustion by the end of the battle.

(e) Flagging of routes by R.M.Os. and the full use of guides provided by the

¹ Actually liaison with R.M.Os. was carried out by medical officers of field ambulances and senior N.C.Os. Many of the latter were commissioned as "bearer officers" on their return to Australia. Bearer officers were not on the establishment of field ambulances in the Middle East.



(2/6th A.G.H. War Diary)

Evacuation by 2/4th Motor Ambulance Convoy, September 1942.



R.A.P. "Tank Gully" El Alamein.

(Australian War Memorial)



(Australian War Memorial)

The 2/11th Field Ambulance July 1942, before battle of El Alamein.



The "Blockhouse" El Alamein.

(H. G. Furnell)

field ambulances speeds up collection of wounded. In certain cases in this battle, drivers went astray due to inadequate use of these methods.

(f) The value of messages—written unless absolutely impossible—sent back on every vehicle was again forcibly brought out.

(g) One of the dangers of pooling vehicles was illustrated by the fact that two vehicles were lost, and their loss was not discovered for some days by the field ambulance to which they belonged. This can be overcome only by the transport officer concerned, constantly accounting for all his vehicles by consulting the Check Post records.

(h) There is one point that should be remembered in considering fatigue of medical personnel.

Fighting troops can fight and endure only up to a definite limit. Medical personnel can work at least as long.

After the limit is reached the troops must rest, so either the tempo of the battle slows, or the troops are defeated. If the first, the medical services can be rested. If the second the matter is taken out of our hands.

These conclusions strikingly resemble those arrived at by other medical administrators in earlier campaigns, but whether further experience in similar military operations would produce still higher grades of efficiency cannot be told, as the campaigns of the then unknown years ahead were entirely different. The A.A.M.C. like other branches of the Service suffered considerable losses, their casualty list being as follows:

Killed	3 officers	10 other ranks
Wounded	4 officers	46 other ranks
Wounded and remained on duty	2 officers	
Missing		4 other ranks

This was the end of the Middle East for the A.I.F. The 9th Division and most of the other Australian troops gathered in Palestine once more, and in the beginning of February 1943 embarked for return to Australia.

CHAPTER 18

LESSONS FROM CAMPAIGNS

THOSE experiences of the medical services in the Middle East from which lessons might be derived have been already described, but it may be of value to refer to these briefly in a consolidated form.

SELECTION OF RECRUITS FOR OVERSEA SERVICE

Several types of recruits for the A.I.F. proved unsatisfactory. These were drawn chiefly from the following classes. (1) The potentially or actually unfit who should have been excluded by adequate examination, (2) those who proved unable to stand sustained strain, physical or more frequently psychological, and (3) the over-age. In addition to these of course the usual attrition of war through illness or injury necessitated further reinforcements. All unfit cannot be excluded by any examination, but a high proportion can be detected, provided that experienced and instructed examiners are used, that they are given adequate accommodation and time for the carrying out of the work including the taking of a history, and that consultant opinion can be obtained concerning special senses and mental make-up.

The disabilities of age either in the too young or too old gave no surprises, but were often not taken into consideration as much as they should. In Libya and Greece the best age period seemed to be over twenty-one and below thirty-five. Colonel Disher A.D.M.S. of the 6th Division found the best officers to be under forty, preferably much less, and those "who had not been handicapped by experience in the last war". The ability to react quickly and to think forwards and not backwards was a mental gift of high value. Even headquarters in rearward or base areas are not immune from enemy attack, and here too age is often a disadvantage.

ACCOMMODATION

No major problems occurred with accommodation either for well or sick or wounded soldiers, except when it was not in the place where it was most wanted. Dispersal impressed itself as an uncomfortable necessity, associated with certain drawbacks, such as the lowered efficiency of the men, who had longer distances to go everywhere. It made official staff establishments inefficient to some extent when units became very busy, for example the 2/3rd C.C.S. in Greece. On the whole troop accommodation was good; in the desert, cover, except that supplied by niggardly nature and that necessary for air defence could only be provided to a limited extent. Camouflage found some soldiers wanting: it was an example of the need for adaptation to the changing conditions of the natural world. The lure of buildings for medical units was often costly. In Greece buildings attracted air attack, even though the red cross was respected. Even in safe areas buildings were often unsuitable for hospital

purposes, and in addition were frequently very dirty. In fixed locations the comfort of huts built after a suitable pattern and economically arranged was a great help to good work.

WORK OF MEDICAL UNITS

The work of the field medical units was naturally of the highest importance, the first link in the chain. As has been pointed out in previous chapters, fears lest the sub-division of companies of field ambulances should lower efficiency proved groundless. Small sections often carried out important work, and secured that necessary mobility which gave medical service to dispersed or rapidly moving units. The experiences of the 6th Division were summarised by the A.D.M.S. as follows:

Mobile sections were budded off from companies and became as required quite independent units even at times bivouacking separately from the parent company: cf. light sections of light field ambulances which did likewise.

Mobile sections consisted of 1-2 officers and 14-20 O.Rs. or more, as required, with two vehicles plus one or more motor ambulances. These sections proved invaluable and gave good training to the captain in charge, who became very proud of his command.

These sections can act as—

- (1) Super R.A.Ps. clearing portion of a wide front,
- (2) Advanced A.D.S.,
- (3) A.D.S.

or as (4) Staging post between R.A.P. and A.D.S., A.D.S. and M.D.S., M.D.S. and C.C.S. where distances are long.

One mobile section can clear a whole brigade front or battalion front as circumstances demand.

On one occasion a mobile section was even divided into half in a rapid advance, one portion being left stationary forming a relay post on the way back to the parent company which was bogged during the rains.

The advantage of the section is that it is highly mobile and flexible and does not add to congestion of traffic. It can always be supplemented as required even to the full strength of the company if necessary.

In mobile warfare as experienced in Libya and Greece the casualties trickled in, rather than came in a rush, and so the smaller section was able to cope with them adequately. They thus saved unnecessarily opening up larger stations and so becoming less mobile. Further they permitted one to an extra reserve up one's sleeve.

Brigades were at first suspicious of them but later asked for them in preference to companies.

The remainder of the company was capable of forming an A.D.S. in the normal manner, usually becoming a rear A.D.S. if such was needed.

A.D.M.S. 9th Division reported that mobile sections proved to be the answer to the medical problems during their withdrawal in Libya.

A.D.M.S. 7th Division used light sections in the early stages in Syria and later some use of light sections of a light field ambulance was made. The Syrian campaign was in general more orthodox in type.

Some wise aphorisms from the same source are reproduced in the appendix.

Siting of advanced dressing stations or collection posts called for elasticity of mind in some situations; indeed the conventional arrangements were often successfully disregarded in favour of others which fitted local circumstances best. Advanced dressing stations were discarded altogether

with advantage under some conditions. Posts for collection of walking wounded were sometimes of little use, and roving transport proved more useful. Some anxiety was felt about casualties in combatant units with high degrees of dispersal. It must be admitted that some of the problems of the first Western Desert campaign would have been more troublesome had the enemy been more persistent and aggressive. Notable among these problems was that of holding men operated on in a forward main dressing station. The principle adopted by the A.D.M.S. should be noted, for it was bound to be exploited in other campaigns, that of combining and permitting attachments of field ambulances without regard for complete individual identity. The idea of a mobile but self-contained field operating unit naturally came prominently to the minds of the experienced workers in the desert, but the campaigns which followed in the Middle East gave no opportunity for trying how this device would work. The static arrangements of Tobruk, the rapid crystallisations of parts of units and the short distances of Syria, the dynamic sweep of Greece and the set piece of Alamein all presented different patterns. Nevertheless it was evident that when the M.D.S. was used as a holding unit even for brief periods the parent field ambulance was immobilised. The C.C.S. with its mass of equipment could not move with ease or speed except under favourable conditions and with borrowed transport, and its light section, though most valuable for certain tasks, proved at Alamein that it could not well be independent without increases in establishment. The good working of the surgical arrangements was partly due to the resource and skill of the surgeons.

A point sometimes lost sight of was the great value of convalescent depots and rest camps. Colonel Johnston emphasised this both in Greece and Syria. Even in Greece steps were taken early to secure convalescence in simply equipped camps for men who did not need hospital treatment. In Syria the forward units would have appreciated the relief that the 2/13th Field Ambulance gave when it arrived and formed a rest camp had this been possible earlier.

When the Middle East period closed, a definite impression had been left on the administrators' minds that the growing elasticity and versatility of the field ambulances made these units the pivot of medical services in the field. Though casualty clearing stations were useful they did their best work when peacefully stationary, and seemed to possess no advantage that could not be found in small field hospitals. There was, however, no opportunity to try these. General hospitals on numbers of occasions moved and opened or closed with remarkable speed, but even the spur of necessity could not overcome the immobility of an extensive and weighty equipment. The psychological effect of an apparently fixed unit has been somewhat ignored. Its members acquire something of the policy of the unit itself, as is evidenced by the amount of the professional and personal belongings which they accumulate and take with them. On occasion medical officers and nurses lost equipment which should have been drastically reduced at the outset.

TRANSPORT

In the actions of the Middle East the most troublesome problem was that of transport. Australia, with small resources in this respect, in the years 1940-1942 was dependent on others for motor vehicles, and the enhanced needs of the peculiar types of country over which battles were fought made shortages even more striking. It will be remembered that one field ambulance was virtually immobilised in the first Western Desert campaign for lack of vehicles. This question of transport affected the whole medical problem of action, not merely in the matter of evacuation of the sick and wounded to rearward units, but in their conveyance to a forward surgical post. We must hasten to admit that the stretcher bearer was as necessary as ever. In the desert the work of bearers was sometimes as hazardous as it has ever been, and in parts of Greece and Syria the fortitude of both bearers and patients was fully tested. The need for medical orderlies in ambulance cars was sometimes felt. When journeys are perforce long by time, even if not by distance, there are occasions when orderlies with some medical training could render useful aid to patients *en route*. Staging posts sited suitably for inspection and, if necessary, resuscitation, provided a partial answer. A transfusion begun at an aid post can be continued in transit if facilities exist, and may save life.

Early in the Libyan actions it was evident that conditions of evacuation introduced other factors in treatment. As has been pointed out, adequate immobilisation of fractures was a necessity if wounded men were to reach the next stage in reasonable condition. Air evacuation was only occasionally possible in the Middle East, for aircraft could not be spared at that time, but the advantages were obvious and outstanding. The great assistance of light aid detachments in the maintenance of vehicles used for medical evacuation deserves notice, an unseen but important factor in a successful system. The wear and tear of long hard travelling increased the need for more vehicles; indeed the medical services were forced like other services to think in terms of wheels.

Ambulance cars were derived from army sources, and from the British and Australian Red Cross Societies; both American and British vehicles were used, and in future plannings for defence from the medical point of view supplies of motor vehicles must be an important item. Ventilation was difficult to secure in ambulance cars. Some, like the British type, were closed in by doors at the rear, and even with rotary ventilators in the roof were close and stuffy. On the other hand vehicles closed by some type of curtain were extremely dusty. The comfort of the ambulances varied considerably; springing designed with regard to the roads to be traversed helped patients to arrive in better condition. In some vehicles racks for stretchers were fragile and fitted poorly: the importance of standard fittings, made accurately and robustly is obvious. Some arrangement whereby a man may be carried propped up was found desirable in certain cases, and facilities for continuing intravenous therapy or duodenal suction drainage were also needed at times. Passive air defence sometimes

demanding that rear windows on cars should be covered to avoid reflections: the same applied to windscreens also; their removal facilitated night driving in difficult country.

EQUIPMENT

Though it cannot be denied that difficulties were encountered with equipment in the Middle East there can be no doubt of the value and magnitude of the Australian effort in providing medical equipment, and supplies, including drugs. Many items were produced for the first time in Australia, and in great quantity, sometimes sufficient to allow export of surplus to other countries. Yet it would be idle to assume that there were not defects and deficiencies, especially in the early years. Those in Australia, no doubt with justice, felt that the A.I.F. was impatient and that the unavoidable delays were not always appreciated. Even after goods were procured they had to be paid for, a process which was often irritatingly slow in passing through its various official stages, and shipping space had to be found before the goods could begin their final or even semi-final journeys. On the other hand, the A.I.F. could envisage the possibilities of losses, and realised clearly that shortages did exist and that the position could become precarious without reserves. Australian independence too was aroused by the need for further imposition of burdens on the little parent country with a dangerous enemy across the narrow Channel. Several lessons may be derived from these experiences. Personal contacts of people actually working in this technical field can alone resolve difficulties and misunderstandings. The necessity for rigid economy was clearly seen in the Middle East, and this was all the more difficult when a truly high standard of technical performance was demanded and maintained. Lastly, the practical problem of packing needed closer study. Here again personal conduction of valuable material was found desirable and all the details arising from the transport overseas of precious and often fragile equipment called for a firm and standardised practice. It was important to realise that medical equipment was bound to become more extensive to meet modern requirements.

It is only right to comment that the capacity to extemporise was well in evidence in the Middle East campaigns. Perhaps the hygiene service should be given special praise for their work in this regard, and their efforts to bring home to each soldier his personal responsibility. The collective hygienic conscience of a unit is after all only the sum of each individual conscience, kept active by teaching and discipline.

Communications

Faulty communications made medical work difficult in most campaigns. The solution of this problem is no doubt in part a technical problem, but all administrations in the field emphasised the necessity for personal contact between a person with some authority and knowledge of the situation and the units doing the actual work. The A.Ds.M.S. of every division of the A.I.F. found that personal liaison with their field units far surpassed

in value the writing of operational orders. One caution emerged from the desert fighting; an ambulance commander had to keep in close touch with the medical personnel depending on him, but it was also necessary that his whereabouts should be known and that some responsible person should always be obtainable at his headquarters in case of movement or other important event.

The value of a liaison medical officer in joint campaigns was well illustrated in Greece, where this officer certainly was much better informed concerning the medical situation, and in some respects the general situation too, than those whose duties tied them to a general headquarters.

NURSING SERVICES

Unfortunately nurses were often compelled to remain idle during time of stress because the military situation did not permit them to work in forward areas. Different opinions were expressed on this question, for example in Tobruk and in Greece. Only those on the spot can give the correct answer, but among them there was not always unanimity. There can be no doubt whatever of the immense value of the work of nurses, and without detracting from the splendid work done by medical orderlies in many places they cannot be expected to replace fully highly trained and experienced women, who bring their own special personal touch to their technical performance. After the Grecian campaign it was apparent that it would have been wise to withhold nurses from Greece till the stability of the position was more assured. It was evident too that had the question of returning nurses to a base area been decided earlier much anxiety would have been saved, and their movement would have been simple and much less perilous. This leads to the need for training of orderlies, which was taken very seriously in 1941 in the Middle East. A high priority should be given to this work, and all concerned, surgeons, physicians and sisters, should be impressed with the duty which rests with them of helping to train these men to assume responsibility as well as carry out routine work. Moreover, though some time must be taken to fit orderlies approximately at least, into the military picture, this should not lessen the time spent in technical training.

TECHNICAL FEATURES OF MEDICAL WORK

New techniques and their modification or extension usually call for some administrative changes. For example, facio-maxillary and plastic surgery, orthopaedics, and other specialties often need either special departments, or special facilities and accommodation for their work. This is reflected in the establishments of hospitals, which may need some additions, as nurses and orderlies are diverted from general to special work. Dermatological wards, for example, were most efficiently run when nurses with special experience supervised and carried out the often frequent and exacting treatment. This in turn brought problems of rostering the nursing staff as a whole, for night duty in particular. These are domestic problems, but they arise, and can only be solved by placing all-

round efficiency first without allowing standards to suffer, or enthusiastic specialists to escape their proper share of economy and improvisation.

In the same way a nice balance has to be preserved between the sending of patients to special departments perhaps housed in some distant hospital, and their retention in other hospitals whose staff feel capable of rendering similar service. In this regard it was not always found possible to carry out the letter of administrative instructions, but compromise was always possible. It must be remembered too, that changes in the military strategic position may negate the value of medical plans and thus subject them to unwarranted criticism. There were several instances of this during the Middle East period.

The advisers in special subjects appointed by the D.M.S. were perhaps not so fully functional as they might have been because of the general shortage of medical officers, which forced them to combine their unit duties with those of advisers. They were therefore of greater value to the D.M.S. in the framing of policy than they were to individual units and medical officers. However, the need could be seen for consultants who could move about amongst the medical officers and give instruction by the most useful method, that of showing how the problems of the moment could be solved. The value of the A.I.F. consultants in medicine and surgery to the medical services and to the force needs no further emphasis. The value of having a psychiatrist was seen in the late stages of the El Alamein battle. It might have been valuable had a study of self-inflicted wounds been made throughout the 1940-1942 period; this and other psychological problems of the army demand first hand research by those with special knowledge.

A growing recognition of the necessity for medical technical advice was discernible through the Middle East experience. Even in 1942 there was still evident some of the obsolescent tendency of some combatant officers to brush away medical scientific advice, probably because it is about the only technical subject on which most people have personal views. But this resistance was yielding to the pressure of experience: for example, the official attitude to malaria prevention was different during the later stages of the Syrian adventure than in the earlier weeks of the campaign. It was clear too that advice based on medical grounds was of value in proportion as it bore on the military situation.

Finally one general observation may be made concerning one aspect of morale. Medical units are in no way different from others in the sensitiveness of their staffs to their psychological environment. They may be disturbed because of idleness, or overwork, or insufficient staff, or shortage of supplies and may even think that they are the victims of neglect. These feelings are usually dissipated by personal contact with an A.D.M.S. or higher official, but there can be no question that the most valuable method of sustaining morale assailed in these ways is for responsible officers to be taken into the confidence of their leaders. Units or formations and even headquarters sometimes persistently complained when their grievances would have been quickly stilled had they known

the reasons for them. This casts no reflection on the excellent liaison maintained between England, Australia and the Middle East, and between the various medical headquarters and the elements of their commands. Nor should it be implied that medical units were lacking in that finer spirit that surmounts reverses, their history disposes of that. Yet it is better to walk in light than in darkness if the cause of safety permits.

APPENDIX

Australian Military Forces
Director of Medical Services A.I.F.
Administrative Instruction No. 5

D O N ' T S

1. DON'T suture wounds except to stop haemorrhage—all break down.
2. DON'T remove edges of wounds.
3. DON'T unnecessarily cut tunics, e.g. to give morphia—there are other places to give it than the upper arm.
4. DON'T remove boots from cases of fracture of the lower limbs. They are better for traction than skin. Pins of Thomas splints require boots.
5. DON'T tear up paybooks if they have been removed from kits of evacuated casualties.
6. DON'T forget to remove ammunition and loaded revolvers from casualties. Search pockets for hand grenades.
7. DON'T use loaded rifles as splints.
8. DON'T redress cases unless they are bleeding—leave well alone.
9. DON'T forget that motor ambulances if attached from field ambulances to you are not yours, but are only under your orders as regards to move to places of safety and for evacuation of casualties from R.A.P. to field ambulance.
10. DON'T take NO from your unit as an answer to requests for water for the R.A.P. Your unit is entitled for an extra supply for the purpose. See that you get it.
11. DON'T hoard stretchers, the field ambulances are very short of them and there is barely sufficient reserve.
12. DON'T forget to use plenty of directing signs.
13. DON'T allow spectators. Kick them out.
14. DON'T leave all supplies in R.A.P. truck. Divide and place some in slit trenches. Also spread supplies over several or all field ambulance vehicles—not all eggs in one basket.
15. DON'T forget to help the man in front.
16. C.Os. must not be away too long from M.D.S. Notify itinerary. 2 i/c must know whereabouts and conditions. If you state you will be back by a certain time make every effort to be punctual.
17. DON'T talk about what you have not got. See what you can do with the things you have got.

The above DON'TS are promulgated for guidance as a result of practical experience in Sidi Barrani and Bardia battles, as well as experience gained in previous wars.

These rules were issued by A.D.M.S. 6 Aust. Div., on Jan 13 1941, and are forwarded for instruction of all M.Os.

CHAPTER 19

PRISONERS OF WAR IN ITALY AND GERMANY

1. FROM LIBYA AND CRETE TO ITALY

DURING the retreat from Cyrenaica at dusk on Sunday 6th April 1941 the traffic was packed in some confusion on the desert road to Tobruk. The Headquarters Company of the 2/8th Field Ambulance, ordered to retire with their patients, packed up their main dressing station and moved on, taking even patients who had just had operations and blood transfusions. Unable to remain together on the road in the darkness many vehicles took the road to Derna airfield. About midnight at the cross road to Mechili a man dressed in Australian uniform and hat directed Major R. T. Binns and others along the aerodrome road. In Chapter 9 a brief description has been given of how the convoy turned into a basin in the Wadi El Fetei where all were taken prisoner by the Germans. During the next day or two hundreds of cars were captured there, including those carrying Generals Neame and O'Connor and their staff, other detachments of the A.I.F., and of the R.A.A.F. and of the 2nd British Armoured Division. Major Binns, Captain G. Gilbert and men of the 2/8th Field Ambulance had twelve vehicles of their unit with them, and the Germans at once gave permission to open a dressing station for the treatment of the wounded. Additional Australian casualties, three fatal, occurred when Germans fired on vehicles; next morning several British officers and men were wounded, one of them, Brigadier Remington, seriously. Binns and his men treated all these: the brigadier was sent by air to Benghazi but later died there. On 8th April the members of the field ambulance were taken with the wounded, both British and German, to Derna hospital. Here there were ample supplies and equipment left when the 15th British C.C.S. evacuated the hospital, and ample accommodation and facilities were available. Many British patients after their capture were treated in the hospital at Derna until they were transferred by Italian and German ambulance or by air to Benghazi; some were flown direct to Italy.

At Derna Binns was joined by Captain E. W. Levings, R.M.O. of the 2/3rd Anti-Tank Regiment, who had been captured at Mechili. Together these officers worked in this hospital for five months. Their patients were of several nationalities, and included men from British units, soldiers from the 9th Division A.I.F. and Australian airmen. Some of those wounded in counter-attacks were admitted from time to time and from them an idea could be gained of the events in the Tobruk and Salum areas. Some of the British troops who arrived in Derna had contrived to reach the African shore after adventurous journeys from Greece and Crete, only to be taken prisoner. Numbers of men with severe battle injuries were in hospital; at first many of the sick came from the prison camps with dysentery, but could be treated only by the old sodium sulphate method. No

Red Cross supplies were available at any time. In Derna seventeen patients died, chiefly from perforating wounds of the chest, severe gunshot wounds and septic amputation stumps, after guillotine operations by the Italians. The Italians provided medical supplies in addition to those stores already found in Derna. For the first two weeks food supplies came from stocks carried or collected from captured vehicles by permission of the Germans. Later the Italians supplied food from the kitchen of the field hospital. The hospital, formerly under the civil administration, was well built of stone, in pleasant grounds with trees and vegetable gardens; the water supply was good and ample, and the buildings were modern and afforded good facilities for medical and surgical work. Most of the major operative work was performed by Levings.

Derna was frequently bombed, especially on moonlight nights: bombs fell in the hospital grounds, but with only one casualty, an Italian orderly. Binns kept records of all admissions in an admission and discharge book; these with all records of deaths were eventually sent by the Italian Red Cross to the International Red Cross, and so back to Australia. By 23rd August 480 sick and wounded were treated, and on this date the field ambulance detachment was transferred with the remaining sick to Benghazi camp for prisoners of war, where others had been periodically sent. The captives were sent to Tripoli, whence the majority travelled by ship to Taranto in Italy and onwards to Capua. Some, including members of the 2/8th Field Ambulance were kept in Tripoli for several months, where they were most unhappy, and even protected personnel were forced to do hard labour.

In Italy. The officers were separated from the men and were sent through Rome north to Montalbo Camp No. 41 near Piacenza. At Montalbo camp were some seventy British officers including seven Australians, and a hundred Greek officers in the same building. The camp was in an old three-storeyed castle surrounded by a moat and standing in very small grounds. After three months Binns and Levings were transferred to Camp No. 57 at Gruppignano in Italy at the foot of the eastern Alps, and later the Australian officers were transferred to the Australian officers' camp at Sulmona. Levings was also at Hospital No. 203 at Castel San Pietro, which was a very good place, but poorly administered and controlled by the Italian officers. Levings was the only Australian there and only some twenty Australians passed through this hospital. He worked also at Spittal in Austria, where most of the important positions on the staff were held by Australians, and where 12 per cent of the total patients were Australians.

Life in these prison camps, in relation to physical and mental well-being, depended largely on the administration and in particular on the commandants. Gruppignano in Northern Italy had been used as a Yugo-Slav camp, but was later used mainly for captives from the dominion forces. Australians came from Bolzano and Capua, and at the end of 1941 there were over 700 Australians. Binns and Levings were joined there by Captain J. J. Ryan, who was taken prisoner in Crete, where he was

the R.M.O. of the 2/11th Infantry Battalion in the Retimo area. Before arriving at Gruppignano, Ryan was in a camp 100 miles east of Rome, where British medical officers were allowed to visit other prisoners, but the Italians assumed the responsibility for their care. Here skin affections were troublesome and formed a large proportion of the medical disabilities. Ryan worked at Gruppignano from the beginning of December 1941 to 1942 when he was repatriated to Australia. Binns worked in this camp till April 1943 when he, with men of the 2/8th Field Ambulance was also repatriated. Levings was then replaced in Camp No. 57 by Captains Lusk and Burns of the New Zealand Medical Corps, and was transferred to Castel San Pietro near Bologna. By January 1942 about 1,000 prisoners were there, mainly Australians, with a few Cypriots and Palestinians: later many New Zealanders arrived. Officers were lodged in a compound quite separate from the men, and their only contacts were during the morning sick parades at the infirmary, during the whole of which they were under heavy guard. After the first nine months the medical officers were permitted to visit the men's compound at will. By 1943 there were five compounds, and an officers' compound, holding in all 4,800, of whom 2,000 each were Australians and New Zealanders; the care of these men rested with the three Australian medical officers under Italian supervision. The men were accommodated in wooden barracks: their sleeping arrangements consisted of two tiers of beds with straw palliasses and blankets.

The infirmary accommodated thirty patients, for whom some medical supplies were provided by the Italians, but the bulk came from the British Red Cross. There was an isolation block of fourteen beds. In all serious surgical cases and in those requiring special investigation the patients were sent to a neighbouring Italian military hospital at Udine where British medical officers were not permitted to visit. In September 1942 the medical officers were transferred to the infirmary, and were allowed to move freely about the camp under the close surveillance of guards. At the same time British medical orderlies were permitted to carry out all nursing duties in the infirmary in place of the Italians who had performed them previously. Eventually members of the staff of the 2/8th Field Ambulance were allowed to assume control of this work, which was carried out at a very high standard of gentleness and efficiency. Only canvas stretchers were in use in the infirmary, which made handling of sick men difficult. At a later stage two R.A.M.C. and two N.Z.M.C. orderlies were transferred to Udine to do nursing work there: self-trained Australians and a New Zealand orderly also worked there, where previously only Italians were permitted.

Food and Nutrition. Physical conditions attributable to malnutrition were very rife, and beriberi in all forms was common. The Italian dietary in Gruppignano consisted of two meals a day, consisting of thin stew containing a very meagre amount of meat, or rice or macaroni soup. Two hundred grammes of bread per day were provided, with a small piece of cheese and a small amount of sugar, but this diet was insufficient to maintain weight and energy. When Red Cross parcels began to arrive in

1942 a parcel per man per week was issued; this helped to restore weight and strength, but it was found that a parcel every fortnight was not sufficient in the cold weather. Very little food could be bought at canteens. There were serious currency problems in Italy: credits were made in Italian currency for messing charges and extra purchases, but the debits on prisoners' accounts were made only at 72 lire to the pound sterling whereas the value of the lira at that time was 480 to the pound. Kitchens were reasonably adequate, but since no facilities were provided for cooking or heating food from Red Cross parcels, hand-made stoves were improvised.

During the period June to August 1942 men captured in Egypt and Libya and kept in poorly organised camps in Libya were often observed to have signs of beriberi and other food deficiency diseases. The quantity of food in these camps was insufficient, and bad camp conditions and dysentery further lowered nutritional standards. Twenty deaths occurred in the camp, about one a month, chiefly among these men, who arrived in Gruppnano in a very exhausted state, but many of the men with beriberi made good recoveries with careful treatment.

Hygiene. Hygiene was primitive. Hot showers were provided but break-downs were frequent owing to the aging of the plant. As the camp increased in size no additions were made to the baths and ablutions and these were then grossly inadequate, even a weekly bath being impossible. Water restrictions lessened the value of the rough arrangements made for washing, which provided only one tap per fifty men. Latrines were of the open pit type and were inadequate, and it was only with difficulty that the administration could be forced into emptying overfull pits.

Dental facilities. An Italian dental officer was on the staff but he did only occasional extractions, and sent cavity work to Udine where the standard was poor. Dentures could be bought at a price, 1,200 lire. After a great deal of persuasion the Italians put up a small dental unit, where a dentist, Sergeant D. McLeod, serving with the 2/15th Battalion did excellent work with slender supplies. The British Red Cross sent in equipment for making dentures, but this only arrived a few weeks before the Italian armistice.

Medical Conditions. Little help could be expected from the Italian medical officers in this camp, whose standard of practice was described by Levings as "extraordinarily low", and their "ignorance appalling". Unfortunately decisions on policy often rested with them.

Malaria was seen in the camp in July 1942, when sixty cases appeared among Australians and New Zealanders from Bari camp in Southern Italy. Supplies of quinine were limited, but the British Red Cross in London sent further stocks, and the patients soon recovered, helped by the cooler climate of Northern Italy. Malaria was also seen in men coming from Greece, and recurrences were common during the ensuing summer. The range of medical work was considerable, owing largely no doubt to unsatisfactory nutritional standards. Skin conditions were common, chiefly due to ectoparasites such as acari and lice. Pneumonia was

common and usually associated with massive consolidation, a striking feature being the high percentage of copious pleural effusions of serous type, which responded well to aspiration and rest. Hepatitis was frequently encountered especially among new arrivals from the desert. Other infectious diseases were common including diphtheria. One feature of the upper respiratory tract infections was the very frequent association of acute nephritis with tonsillitis. The renal complication was the nephrotic type, with massive oedema and a high proportion of protein in the urine. The prevalence of these presumably pneumococcal and streptococcal infections was considered by the medical staff to be due to the insanitary degree of crowding in the sleeping huts, and indeed, in the whole camp.

Psychiatric conditions were few in Gruppignano. There were only about seven or eight recorded cases of definite psychosis in two years. Sergeant Day, a trained mental nurse, was able to move freely about the camp and reported only psychiatric abnormalities. The number of neuroses and transient psychotic states treated in the infirmary and on the sick parades was exceedingly small, in spite of the trying circumstances. Levings considered that the Italian armistice saved numbers of men from a breakdown and was struck by observing how greatly they had improved physically and psychologically when he saw them later in Austria. The incidence of psychological disorder in Wolfsberg area in Austria where there were 15,000 men was less than in Camp 57 where there were 5,000.

Though accommodation in Gruppignano was tolerable, and facilities were given for outdoor diversion, nevertheless this was in general a poor camp, and much below the average standard of German prison camps, but even worse was the atmosphere of cruelty. The commandant, Colonel Vittoria Calcaterra, had painted on the wall above his desk a motto from a speech of Mussolini "The English are cursed, but how much more cursed is any Italian who treats them well". He and his staff carried out this principle in their dealings with the prisoners. Men were subject to being gaoled for trivial offences or none at all, and were given thirty days in cells, the first half in irons, and on half Italian rations, with no supplements, books, cigarettes or writing material. Most men lost a stone in weight during this period, and the whole camp was pervaded by a fear of similar harsh treatment. The representative of the protecting power was able to help at his monthly visits, but was never allowed to interview officers without witnesses.

Repatriation. The selection of the sick and wounded to be evacuated from Gruppignano was made by a mixed medical commission, consisting of one Italian and two Swiss doctors representing the International Red Cross who chose nineteen out of thirty men as suitable in addition to seven others with mutilations and six with various medical conditions. British medical officers, however, considered that at least sixty more men merited repatriation.

Red Cross Activities. The value of food parcels sent by the Red Cross was very great; this was exemplified in 1942 when for some months the supply was interrupted, and the deterioration of the men's condition

became obvious. The timely gifts of the British Red Cross helped the medical officers greatly in their work, and the supply of British battle dress, underclothing and boots by the International Red Cross, and medical supplies enabled the men to withstand cold and disease.

2. FROM GREECE TO GERMANY

On Easter morning, 14th April 1941 the 2/5th Australian General Hospital landed at Piraeus in Greece and began to establish a hospital at Ekali twelve miles north of Athens. The necessity for the force to leave Greece made the period of the complete unit's activity disappointingly brief, and on 23rd April most of the officers and about 100 men were sent out. On the 24th the commanding officer, Colonel W. E. Kay, was also ordered to leave; it had been decided that the nurses should not remain, and during the night 24th/25th April the last of the nurses were safely evacuated and 250 walking wounded. Major Brooke Moore was left in command, with six other officers, two warrant officers and 148 other ranks to carry on the work of a 1,200 bed general hospital, which then held 112 patients, all too ill to be moved. Most of the equipment was unpacked, and rations were held for 20,000 men. Six Greek nurses voluntarily came to help, and remained while the hospital was at Ekali. One member of the staff spoke German fluently. On the morning of 27th April the Germans arrived and peaceably put the hospital under military guard, allowing the medical and surgical work to go on without hindrance.

The German medical unit which took over the hospital was a mobile version of a casualty clearing station with excellent equipment. Their portable X-ray machine had its own power plant, and could be unpacked and brought into use in a few minutes. Unfortunately the X-ray unit was not working and the 2/5th Hospital portable unit was taken to replace it, leaving the fixed unit which could be used for screening, barium meals, *et cetera*, as well as fracture work. The members of the German Medical Corps were all armed with pistols, owing, they said, to the danger of snipers in Poland. Their professional standard appeared to be high. On 7th May, after twenty-four hours' notice, an advance party under Captain J. E. V. Barling was sent to Kokkinia, where the hospital was transferred, and two days later the unit was settling down in its new location. The new site was a new and very large building on the west side of Piraeus, with good running water, sanitation, and electric light. There were four blocks each of four storeys, and one of three floors. This provided eighteen wards, holding twenty to forty beds each, and all the usual special departments. On 10th May the first convoy of wounded arrived from the south, twenty-nine men with nine New Zealand medical officers and four dental officers.

Meanwhile the 26th British General Hospital had been working independently at its site at Kephissia two miles away, but now the Germans decided to disband it, and by the middle of May had transferred about 200 patients to the 2/5th A.G.H., with some rations and equipment. The staff of the 26th British Hospital was then distributed to prison

camps in the Peloponnese, and some officers were sent to 2/5th A.G.H. From this time onwards the staff of the hospital was continuously increased by attachments of Australian, British and New Zealand medical and dental officers, chaplains and other ranks, gathered in by the Germans from other captured units. By 20th May there were 28 officers and 188 other medical personnel and 621 patients.

Following a warning of the arrival of large numbers of casualties, on 23rd May the first casualties came by air from Crete, and within a fortnight 1,500 sick and wounded from Crete were admitted. All these patients were brought in returning *Junker 550* troop carriers, mostly by night. The majority of the wounded had had no more than first aid, often given a week earlier; they were extremely exhausted and suffered severely from hunger and thirst. Very few were dressed; many wore only a shirt, or a pair of pyjamas, or even only a surgical dressing.

By the middle of May the food problem was pressing, and the Germans provided 300 extra rations. There was little supplementary food for the very ill, but milk, up to eighty quarts a day was bought from the Greeks until the high price and its high water content made the purchase no longer practicable. The first care at this time was the wounded from Crete, and the orderlies voluntarily gave up much of their own food to them. A small canteen was opened at which were sold, cigarettes, toilet requisites, fruit, especially melons and grapes, and such other commodities as could be bought from the Greeks. The financing of these arrangements was made possible by payments of protected personnel by the Germans and by the gift of the International Red Cross of about £3,000 in Greek money. All this money was spent in amenities, bought from the workers of the Greek Red Cross, who made weekly visits and were most helpful.

By the end of May the hospital was full, with 1,220 patients, and the Germans opened a new hospital 500 yards away in a draughty Greek barracks. This place was run as an annexe for walking wounded, and was in the capable charge of a New Zealand medical officer, Captain Moody. The accommodation was poor, with wooden benches for beds and very bad sanitation. The number of patients soon rose to 1,590, with 39 officers and 256 other ranks to care for them. When patients were fit to travel they were taken by the Germans by ships to Salonika and thence to prison camps; occasionally seriously ill men were sent away, but they travelled by a German hospital ship, and were transferred to a hospital train for the final journey to Germany, thus being saved the usual trials of travel by horse truck.

On 22nd June the hospital staff heard from the Germans that they had attacked Russia; by this time the captive Australians had acquired a radio set, and thereafter they were never without news, even in Germany. The Germans in the camps found it as hard to understand how this was done as to comprehend what absolute faith their prisoners had in ultimate victory.

In July still another camp was established in Athens to take the overflow of casualties: it was staffed by members of the 26th British General

Hospital and the 1st New Zealand Hospital. A number of patients were sent from here to the 2/5th A.G.H. During this month twenty-five patients made a concerted escape, which appeared to be successful: the principal result was an increase in the vigilance of the guards. At the end of the month the quality and quantity of the food ration deteriorated badly; its caloric value did not exceed 1,350. A letter from the British Red Cross promising help with food parcels was welcomed, though it was the middle of September before parcels arrived.

A number of patients were selected as suitable for repatriation on medical grounds, and these were taken from the hospital, though they were not finally sent home till September 1943. The traffic of patients to Germany increased in September 1941, and the convalescent depot was closed. Many civilian internees arrived from Crete at this time, men, women, and children. Fortunately the main building now easily accommodated all the patients, and enough clothing was in store to enable every one to be issued with a minimum of garments, and two blankets. The Greek Red Cross made a useful gift of 400 pairs of socks. The addition of Red Cross parcels made a great difference to the physical condition and spirit of the patients, and consequently the amount of medical work decreased. The patients improved sufficiently to be sent to Germany and by 4th December the hospital was empty. The end of the Grecian episode for the 2/5th A.G.H. came when on 14th December a last party of 120 members of the staff left for Salonika.

Medical Work of the 2/5th A.G.H. The standard of work remained high in spite of difficulties. Not more than one trained orderly was available for each ward, but some of these were professionally trained in nursing and discharged heavy responsibilities in caring for the sick and training others. Surgery was done in a large and a small theatre, near which was a small post-operative ward. At Ekali Hospital 516 patients were treated, and including 91 admissions from Ekali and 50 civilians, 2,511 were admitted to Kokkinia. The total number of deaths was 79: 109 patients were discharged from Kokkinia as invalids, the remainder of 2,334 were cured or relieved.

In a kitchen designed for 500, meals were cooked for 1,600 men daily. The rations probably never exceeded 1,800 Calories, with very little protein, and the fat was derived from Dutch margarine only suitable for cooking.

There were shortages of some medical supplies, such as strapping and syringes, but reasonable amounts of necessary drugs were supplied by the Germans, and with such stores as could be taken from Ekali and from the 26th British General Hospital when it was closed, most urgent needs were filled. The fixed X-ray machine did excellent work, though films were later hard to obtain. Pathological work was carried out; a total of 1,534 tests was performed.

Fortunately the New Zealand dental mobile unit was attached to the hospital, and four officers and three mechanics, using equipment from Australian, New Zealand and German sources, did excellent work. In

addition to the routine fillings and extractions, the dental surgeons did valuable facio-maxillary and prosthetic work. Twenty-one vulcanite artificial eyes were made, and over 200 dentures.

Brooke Moore has summarised the surgical work of the hospital as being chiefly the treatment of advanced sepsis, owing to the delay and unavoidable neglect that were the lot of numbers of the wounded. Plaster was used only to a limited extent, because of shortage of supply, and also because of the prevalence of the voracious local bed bugs which invaded the casts. Eusol and acriflavine dressings were commonly used. Cramer wire splints were used for shoulder fractures, and fractured femurs were treated with Thomas or Hodgen splints with wire extension through the tibia, as Steinmann pins were prone to break. Sulphapyridine was used with advantage for sepsis. Secondary haemorrhage was not uncommon, even from main arteries, but there were no deaths from this cause. Fortunately dressings were always obtainable in sufficient quantities, occasionally augmented by the Germans from their neatly wrapped stocks. Some of the packages, sterilised in greaseproof paper, had not been touched since the previous war in 1917.

Resuscitation was well provided for; the hospital's supply of soluvacs of glucose and saline was used, and blood for the 100 transfusions given was derived from convalescent Australian patients, whose blood typing was always found to be accurate.

Records show that the following conditions were treated:

Head injuries: 88 cases treated, with 13 deaths, 11 due to perforating injury.

Chest injuries: 100 cases treated, most of which were not severe; the 5 deaths were mostly due to other severe injuries.

Abdominal injuries: Of 39 patients 6 died of perforating injuries. It is obvious that men with the most serious thoracic and abdominal injuries never reached hospital.

Injuries of jaw and face: These were extensive, and many of the 30 men treated would later require plastic procedures.

Fractures: 68 simple and 349 compound fractures were treated, with 11 deaths among the latter. The lack of a portable X-ray machine made it difficult to prevent deformity.

Joint injuries: Some of these were severe: 9 deaths out of 132 were due to sepsis and bleeding.

Lesions of nerves: 153 were treated, but neither primary nor secondary suture was possible in the circumstances.

Soft tissue wounds: Only 15 patients died out of 658; most of the results were good: a few needed skin grafting.

Out of 46 eye injuries 16 enucleations were necessary.

Vascular lesions were seen in 13 instances.

Finally, a review of the work of this hospital emphasises how fortunate Greece, and that a detachment of the original staff remained to make so outstanding a contribution to the work of the A.A.M.C. in Greece.

3. THE AUSTRALIAN HOSPITAL GROUP IN POLAND AND GERMANY

The members of the 2/5th Australian General Hospital after handing over their equipment intact to the Germans went to Salonika, but stayed there only thirty-six hours. Descriptions of the medical conditions in the prisoner-of-war camp at Salonika were very unfavourable. Medical officers described the frequency and intensity of the malnutrition existent there. Famine oedema and beriberi were common, especially during the summer of 1941. Lieut-Colonel Le Souef found the accommodation in old Greek barracks to be very poor. The quarters were crowded; each pair of beds was kept in contact, vermin abounded. Captain Cochran, R.A.M.C. stated that there were hundreds of cases of beriberi and famine oedema. The diet was very bad, only about 1,200 Calories, with some supplements from the Greek Red Cross, but from November 1941 onwards the position was bettered by the arrival of Red Cross parcels.

From Salonika the 2/5th Hospital party travelled by train to Poland and arrived at *Stalag* XXa at Thorn after twelve uncomfortable days in horse trucks. There were about 7,500 British troops in this camp from all over the Empire. Brooke Moore's party was lodged with 700 warrant and non-commissioned officers who had, after a bitter struggle for their rights under the Geneva Convention, successfully resisted attempts to make them work for the Germans. The weather was intensely cold, and during a stay of eight months in this camp the food value dropped from 1,850 Calories on arrival of the party to 1,550 Calories. Conditions in general were bad. A British hospital of 150 beds was working a mile away and Brooke Moore, who acted as medical officer to the N.C.Os. was allowed to visit there once or twice weekly. Major surgery was performed by a German surgeon in a German military hospital in the town of Thorn, who treated the patients with care and skill. In several German military hospitals in the town amputations were common, chiefly due to frost-bite suffered by the German soldiers on the Russian front, who were apparently insufficiently protected against the bitter cold. Only a few cases of frost-bite were seen among the Australians in Poland.

The most serious condition seen in *Stalag* XXa was tuberculosis of bones and joints among the working parties, which was thought to bear some relation to a combination of cold, deficient diet and exhaustion. It appeared to be relatively common among New Zealanders, and cases were observed to occur among several members of the same group. There was a hospital for tuberculosis in the Black Forest, and to this patients were transferred from time to time after immobilisation of the affected part in plaster. They were given an improved diet so far as this was possible.

Brooke Moore also had experience of an *Oflag* in Westphalia. Here too the surgical work was carried out by German surgeons in their own hospitals, and the medical work in the camp was only of the R.A.P. type. Conditions were strict here, but the spirit of the officers was always high. In December 1942 Brooke Moore and five other medical officers

were sent to *Stalag* 383 in Bavaria in the neighbourhood of Regensburg. Here they stayed until their repatriation. In this camp were 5,000 non-commissioned and warrant officers; conditions were better than in some other camps, for the food was reasonable, and there were facilities for sport and educational and diversional activities. Equipment for the care of the sick was obtained from the British Red Cross by permission of the Germans, and in this way surgical work was made possible, and medically the camp was self-contained.

In the spring of 1943 the medical officers made a complete physical survey of the men, and took all steps possible to bring them into a satisfactory condition. During the next fifteen months 80 operations for hernia were performed, 40 for appendicitis, 50 other major operations and some 2,000 minor procedures, with good results. Local anaesthetics bought from German sources were used as a rule, but the Germans supplied ether for abdominal operations. One curious feature in this camp was the frequency of salivary calculi. The nutrition of the men was fairly satisfactory, but towards the end of the period many men were noticed to suffer from sprains and bruises which were slow in resolving. Operation wounds were also slow in healing unless vitamin C was given. A small supply of the concentrated vitamin was obtained from England, and rations were supplemented with green vegetables grown from seed procured locally. Only three deaths took place in twenty months. As mentioned above, a group of men had been previously selected as suitable for repatriation on medical grounds: these were returned after a considerable delay. Amongst them was Brooke Moore.

Clothes were supplied by the British Red Cross, apparently discarded army battle dress and boots: shirts and other items were sent in clothing parcels which were distributed every three months. At a later period difficulties in transport prevented the arrival of Red Cross food parcels, and deficiency diseases, including severe forms of beriberi, again appeared.

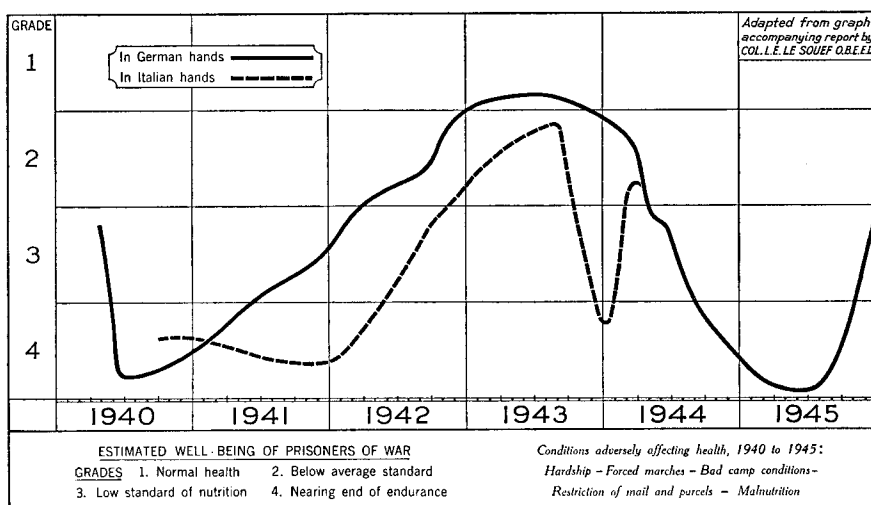
Captain N. H. Rose had experience in working a hospital for prisoners of war of mixed nationalities. With a British medical officer he went in October 1942 to a newly established hospital of 500 beds on the Oder River in Upper Silesia. In this industrial area there were large numbers of prisoners engaged in labouring work, such as mining and road construction. Many of them, especially the Russians, showed evidence of gross malnutrition; practically all had oedema due to lack of protein. The ward accommodation was not arranged according to types of disease, and patients with respiratory infections, even tuberculosis, were in the same wards and in the same double or treble tiers of beds as those with surgical diseases or accidents. The sick were sometimes treated with physical violence and their death rate was high.

The medical staff after strong representations succeeded in establishing that beating of prisoners should cease, and that administration of the hospital should be a medical responsibility. The lack of orderlies and other technicians was overcome by selection and training of intelligent patients, and these did excellent work. The sick were placed in wards

appropriate to their condition and an immediate improvement in results followed. Diet was a serious problem in this hospital, owing to the usual lack of protein and fat, but parcels from the British Red Cross were applied to the purposes for which they were most needed, the well-being of the sick regardless of nationality. Vegetables were grown in special gardens, tilled by voluntary labour of convalescents, and funds obtained by canvassing the British prisoners, were used for the purchase of extra food and useful articles of many kinds. With this fund and the help of voluntary labour, buildings were erected and equipped, providing facilities for surgical and medical diagnostic work, and amenities for the patients. Rose performed in fifteen months 375 major operations of most types; the results were good, and no deaths occurred among the British patients during this period. The progress of this hospital over the period of captivity illustrates what may be done by sustained enthusiasm and effort, provided that the detaining power cooperates reasonably and does not interfere with the work.

4. THE CRETE GROUP'S EXPERIENCES IN GERMANY

The British and Australians captured in Crete who did not pass through the 2/5th A.G.H. had less favourable experiences. Lieut-Colonel Le Souef, the senior medical officer among the Australians in the groups sent from Crete to Germany, has described the conditions encountered in



a number of prison camps. These camps included those at Salonika, *Dulag* 183; *Dieburg IX B*, *Muhlberg IVB*, *Königswarthe*, *Elsterhorst IVA*, *Anneburg 4D, ZW*; *Fallingbostel Stalag 11B*; *Ludwigsburg VA*, *Weinsburg Oflag VA*, and *Brunswick Oflag 79*. The conditions encountered in these camps appeared to vary according as the camp was in occupied territory or within Germany proper. Some prisoners in occupied territories were refused registration numbers until they entered Germany, and in

consequence suffered certain disabilities. The specific conditions in the camps are described under different headings as follows.

Clothing and Bedding. Many of these men were in the same straits with regard to clothing as the patients flown to Greece, and numbers left Crete without boots and wearing only shorts and shirt. In Greece some clothing was obtained, but it was impossible to stop men from trading garments for various commodities. A few civilian coats were procured as the winter approached, but many men left for Germany without protective clothing.

The Germans tried to assume complete control of clothing in the camps, but by vigilance and insistence a fair distribution was usually maintained. The same applied to blankets. The Germans tried to insist on rigid regulations limiting the number of blankets each man should have, despite the fact that extra blankets were supplied by the Red Cross for sick men with tuberculosis. The superior quality of the British blankets ensured the men greater comfort. Trouble was experienced also in obtaining enough covering for the Indians who felt the cold keenly. This problem was specially acute during the severe winter of December 1941 when supplies were being concentrated on the Russian front. In Dieburg Rumanian Red Cross clothing became more plentiful and from this source white coats for surgical work were obtained. Influx of prisoners, for instance from the Western front, imposed a severe drain on supplies. Boots were repaired, usually within the camps; when sent outside they were seldom seen again.

Accommodation. There was a tendency for the Germans to overcrowd all hospital accommodation used for military prisoners throughout the war, and conditions in transit camps, such as Salonika were very much worse, as regards both accommodation and hygiene. The system of placing beds closely together in pairs was one the Australians found hard to break, but two-tiered and even three-tiered hospital beds were even worse, especially when used for patients suffering from tuberculosis. Infectious blocks for tuberculosis were provided in some camps, such as Muhlberg IVB. Le Souef protested against double-tiered beds for patients with tuberculosis in Königswarthe, but in spite of an admission by a senior officer that this was not used as a standard method in Germany, the system was still retained for Serbian and Polish prisoners of war. The International Red Cross sign was seldom marked on the roof of hospitals for prisoners of war, although slit trenches and shallow shelters were permitted. The numbers in the hospitals in several camps constantly rose above the official bed states, and even spirited protests were not always successful. Anneburg was a repatriation centre with a well equipped hospital; the patients awaiting repatriation were well treated, though overcrowded, and the place was regarded by the Australians as a propaganda camp. In Ludwigsburg VA the hospital accommodation was good, with

excellent surgical facilities, though the transit camp was unkempt and neglected. The German administration here was sympathetic and allowed capable French and Polish medical officers to work there for upwards of four years.

Rations and Nutritional Defects. After the surrender of the troops in Crete and in the early days of transit from Crete to Greece and thence to Germany the food was scanty and often of very poor quality, though the meagre German ration was supplemented through the voluntary help of the courageous Cretan people. As already mentioned, the food was very poor in Salonika; it was at practically starvation level of about 1,200 Calories. Matters improved there when a number of prisoners were moved farther on to other prisoner-of-war camps, and when food parcels arrived the position was less strained. It appeared to be the policy of the Germans to undernourish the prisoners in occupied territory so as to reduce their will to resist, since few facilities were allowed them to make the best of such food as they had.

In Germany rations varied. At Dieburg the 1,500-1,700 Calorie diet was supplemented by weekly Red Cross parcels and the products of a vegetable garden, and was reasonably satisfactory. Pine needle tea was supplied as a source of vitamin C; it was used empirically, but its value could not be estimated. In Königswarthe the dietary was good, and tuberculous patients were given extras such as puree, milk, jam and white bread and vegetables were plentiful. These extras were very difficult to obtain in Germany; white bread was almost unprocurable for men with gastric ulcers, and the Germans claimed that their own men had to revert to black bread after three weeks.

At Weinsburg the cooking was good, but the quantity was not enough to relieve hunger, and most of the 960 men in the camp lost 2 to 3 stone in weight. At Brunswick 79 also there was for a time a starvation ration, especially in March 1945 when Red Cross parcels were stopped by the Germans, and officers and men ate peelings from the kitchen. Emaciation was obvious among the prisoners when they were released. Even one-third of a parcel distributed to each man right at the end of his imprisonment made a substantial difference to his physical and mental state.

The German daily ration at *Oflag* 79 in March 1945 was computed to contain 46 grammes of protein, 22.6 fat and 233.7 carbohydrate, yielding 1,324 Calories. Only 7.1 grammes of the protein could be regarded as of first class type, the remainder was derived from vegetable sources. This ration did not supply the basal requirements of an adult man. A special report by Captain B. Kenrick N.Z.E.F. pointed out that continuation of this dietary would cause an outbreak of famine oedema.

A comparison of the scale of the German ration and the British ration as supplied to prisoners of war is given in the following table:

	Weekly Ration supplied by the British to German POW	Supplied by Germans to British POW
Potatoes . . .	1,500 Grammes	2,800 Grammes
Bread . . .	2,520	1,750
Margarine . . .	525	120
Sugar . . .	280	140
Jam . . .	420	130
Meat . . .	1,260	210
Sausage . . .	420	—
Oatmeal . . .	200	—
Cheese . . .	240	25
Tea . . .	78	—
Milk . . .	682	—
Tinned Fruit . . .	135	—
Cooking Fat . . .	—	50
Dried vegetables . . .	—	20
Peas . . .	(see below)	75
Barley . . .	(see below)	100
Turnip . . .	(see below)	1,800
Flour . . .	—	—
Total Daily Calories	2,700	1,324

German prisoners of war were allowed 5,000 grammes of vegetables a week on the same basis as issued to British depot troops.

The complaints about *Oflag 79* are important, because they illustrate the necessity for vigilance of medical officers in securing an adequate diet for prisoners of war. Even the right of the men to receive and use Red Cross parcels to the best advantage was not recognised without a struggle. The same applied to cooking which of course has a very important bearing on the palatability and value of a diet. In general the prisoners were given facilities only for what may be called boiler cooking. It was with the greatest difficulty that medical officers obtained stoves for invalid cooking for patients. The meat ration was usually cut up and boiled with all the vegetables, and loss of palatability sometimes meant the virtual loss of the meat ration.

At Elsterhorst two A.A.M.C. officers, Captain Gallash, and later Captain Holt, took over the dietetic arrangements of the hospital with excellent results. One improvement was the cooking of meat without mincing, for when minced its valuable protein was available only in the form of soup. Many protests were made about underweight issues of meat, adulterated sugar, hard mouldy bread and bad potatoes. These complaints had effect, and eventually better food was obtained, and communal cooking became a great success by reason of the better cooks and better methods. Vegetables and fresh food were frequently lacking, but extra food for the sick was obtained by impartial distribution of the contents

of parcels. In 1942 and 1943 special efforts were made at Christmas time, and good dinners were prepared.

At Ludwigsburg VA medical supervision was benevolent, but a communal kitchen run by French and Russian prisoners of war produced unpalatable food which was unsuitable for the sick. Parcels distributed by the Red Cross were a great blessing, particularly in the welcome food they contained. The contents of these parcels met with various fates in different prison camps. In certain camps the Germans, claiming that illegal material was entering the camps through the tins supplied in Red Cross parcels, used to empty everything into a bowl, meat, sugar, milk, vegetables *et cetera*, without regard to the recipients. In other camps all the tins were punctured, so that they could not be stored. There was evidence too that the official camp ration was altered in accordance with food received by the prisoners from other sources. Thus it was sometimes observed that an increase in the British Red Cross ration led to reduction of the German ration; this even occurred in certain hospitals where tuberculous patients were receiving extra food under directions of the International and British Red Cross. Protected personnel in the camps were entitled to the same food as the corresponding German personnel but this was disregarded.

During 1942 and 1943 only half a parcel per week was distributed from the Red Cross: some of the officers felt hunger, but the patients did not suffer, though some lost weight. Late in 1944 a German order severely limited Red Cross reserves of food in prison camps, and the reduction of one parcel to half a parcel in the weekly distribution then produced a definitely adverse effect. As the end of the war approached the distribution of Red Cross extra ration dwindled and disappeared in many places, and it was then evident that without this help malnutrition became manifest. This had been observed in 1940, and again in 1945, and illustrated the insufficiency of the basic ration. That malnutrition occurred was undoubted. In *Oflag 79* progressive loss of weight was noted in inmates following reduction of food supplements, and with the later withdrawal of these extras a further rapid loss of weight took place.

After five months of the German ration with half a Red Cross parcel per week a number of officers had swollen feet and puffiness of the eyes. When the Red Cross ration failed several patients were seen with generalised oedema, most marked on the ankles, legs and face, and definite ascites. They were weak and short of breath, and felt mentally confused and were unable to concentrate. With increased protein intake and limitation of salt these symptoms were relieved. Nephritis was excluded from the diagnosis, which was undoubtedly malnutrition. As a final commentary on the standards of nutrition in European prison camps it may be stated that the nutritional value of diets in Italian and German prison camps was on the whole inadequate, and in the opinion and on the evidence of Australian medical officers and others often gravely deficient: the threat of malnutrition was never really absent, and often became a clinical reality. This is evidenced by an analysis of a week's

rations at *Stalag XXI A* Germany, which shows the daily ration per man to be as follows:

Protein 51 grammes, fat 41 grammes, carbohydrate 275 grammes, giving 1,803 Calories. This is much below the 3,000 Calories necessary to supply the requirements of a man doing ordinary work.

At an earlier period a curious phenomenon was seen in Königswarthe. Some of the sick actually wasted food, throwing away the German ration of cheese and biscuits, and maintaining themselves on the extra British ration together with other special foods such as bread and potatoes. Bread was given to tuberculous patients uncut to avoid others taking it after it had been handled, but knives were obtained so that it could be sliced before issue so as to save waste. On the contrary, hoarding of food, even mouldy bread, was practised by some, apparently owing to a deeply rooted fear of starvation.

Hygiene. In Crete sanitation in the camps was primitive and only the efforts of British medical officers established reasonable hygiene there and thus prevented spread of infection. In Canea this was made worse by the harshness of military guards who forbade patients to use the latrines at night. As numbers of patients had dysentery this rule caused risk and inflicted hardship.

All the ships leaving Crete for Greece had most insanitary arrangements for prisoners, who were battened down with no other provision for hygiene than an odd bucket, or if access to the deck was allowed, a flimsy structure over the side of the ship, almost inaccessible to debilitated men. In the transit camps sanitation was most primitive and in Salonika soap was not seen till it appeared in British parcels. In most camps water-borne sanitation was available, but nuisances arose in several camps with blocking of tanks and pipes. Water shortages necessitated the construction of deep trench latrines in some places, but on the whole the German camps had an adequate water supply which was only restricted on occasion in hot weather.

Amenities. Walks and games were usually permitted to patients and protected personnel, except in some camps such as Brunswick where a harsh commandant forbade walking. Books were usually available though subject to censorship, which was often slow and vexatious, and in some camps German radios provided German news and music. Recreational and occupational amenities were welcome when available; in the later period of the war many men were too thin and too tired to expend the necessary energy for pursuits involving exertion or even for those designed for treatment. Canteens were organised in some camps and hospitals. In Anneburg the Germans controlled a canteen and returned profits on luxury articles for the use of the inmates.

Red Cross comforts were available for at least part of the period. The lag period after capture before this help arrived was usually about six months. Clothing was also supplied, though difficulties arose with sizes.

At Elsterhorst supplies were received in sealed waggons: this enabled the medical officers to give priority in food supplies to patients needing extra rations, especially the tuberculous. In this camp after collecting evidence that British Red Cross drugs were being controlled and distributed by German authorities, and used in other hospitals without reference to British authority, Le Souef protested to the *Chefarzt*, with the result that he was given custody and control of these supplies. Mail was received only irregularly, at times owing to a lack of sufficient censors and at others to reprisals.

Relations with the German Administration. The Australian medical officer prisoners of war did not hesitate to criticise the administration where it was at fault, and laboured to secure and retain those privileges which are the right of prisoners of war by international law. Le Souef in particular consistently upheld the rights of medical personnel in various camps, and especially championed the patients. British and Australian medical officers throughout Germany made every endeavour to visit working camps in their areas, and in many instances they succeeded in obtaining permission to do so.

Questions of dietary have been touched upon already. It was of course recognised that dietetic problems in Germany were considerable, and at some times and in some places serious, but there were many other subjects on which the senior officers among the prisoners clashed with the German administration. These concerned the rights of the men under the Geneva Convention. Some of these are given as examples.

In Crete on one occasion officers in one camp were made hostages because the commandant expected trouble from a commando attack. In *Dulag* 183 the transit camp at Salonika, and other transit camps officers and men passing through suffered both indignity and hardship at the hands of the guards, who were rather encouraged in *Blutlustigkeit* than otherwise. In Elsterhorst Reserve Lazaret *Stalag* IVA where the tuberculous patients were housed, officers and men doing outstanding work with the sick and in administration were completely ignored in the repatriation move made in October 1943. Le Souef remonstrated to the Protecting Power, alleging that the Germans had broken an agreement with the British Government. General Lohse, D.M.S. of the area, sent two officers to investigate this who asked that in the future communication should be made direct to the German general.

This unusual situation benefited the patients and prisoners in the area, owing to the benevolent views of Lohse; previously little could be done if the local commandant was harsh or unfair. Again, protests were made to the Protecting Power about the state of the tuberculosis hospital at Königswarthe; these condemnations apparently resulted in a transfer of all the patients to Elsterhorst, and an improvement of Königswarthe was made. Later protests against members of the German administrative staff in this hospital were effective in having them removed, but in other areas well-based complaints against harsh or inefficient administrators were

only too often ineffective. Complaints were also made of the poor transport facilities for sick patients, but no redress was obtained until a list was sent of elementary principles of hygiene for application to the trucks employed. Rather to the surprise of the British these suggestions were commended, and improvements were at least promised.

Finally, the attitude of the Germans to medical or protected personnel gave rise to much trouble. Recognition was often denied, certificates were withheld, identity cards were taken, pay and other privileges were refused, and even as late as March 1944 N.C.Os. and medical orderlies were forced to work as prisoners of war. Le Souef states from his experiences that "prisoners did not get their Convention rights until such times as they were able to find out what they were", and it may be added that even then the granting of these rights did not always follow. Le Souef himself was sent as surgeon to care for seriously wounded men from Arnhem at the Lager Hospital Fallingbomel, *Stalag XI B* in December 1944, and in a letter to the Protecting Power for British and American prisoners of war made complaints about defects in hygiene, facilities and equipment in the hospital. In this letter he contrasted the work of British officers and medical personnel with "the apathy and neglect shown by the German medical administration". There is reason to believe that the Protecting Power was able to exert effective pressure in these matters when the Allied force of arms outside Germany became insistent, and the threat of German defeat became more obvious.

CHAPTER 20

IN AUSTRALIA, 1941-1942

WE must here turn back to see what had been happening in Australia while the A.I.F. had been campaigning in the Middle East. Many medical problems called for solution. Coordination and equipment for medical work at home and abroad went ahead as national projects; later, a skeleton scheme for providing emergency medical services was devised. Returning casualties had to be provided with accommodation and treatment, facilities for their transport from overseas had to be expanded. Defence plans envisaged possible hostility directed against Australia, and for these special medical services were needed. Organisation in service medical matters was greatly expanded, and changes were made in the central medical directorate. The claims of women for enlistment in the armed Services were met by the establishment of new or greatly expanded organisations. Questions of health and fitness were given earnest attention, in both the selection of recruits in the light of oversea experience and the maintenance of a good standard of health in civilians doing important work at home. Finally the menace of a war with Japan became a reality, and the forces under training in Australia, and the I Australian Corps, consisting of the 6th and 7th Divisions of the A.I.F. were faced with the responsibility of defence of Australia and the islands to the north. Henceforth it was plain that after the fulfilment by the 9th Division of its last assignment in the Middle East Australia would be, so far as its army was concerned, committed to a difficult and dangerous struggle to deal with the powerful co-partner of the Axis. These subjects will now be dealt with serially.

ORGANISATION

Early in 1941 important changes were made in the central organisation of the medical services at Army Headquarters. Chief of these was the appointment of Colonel F. A. Maguire, a former D.D.M.S. of the Eastern Command, as D.G.M.S., with rank of major-general. It has been told already how Colonel S. R. Burston was appointed as D.M.S. of the Australian Corps by General Blamey, and later was promoted major-general, D.M.S. of the A.I.F. in the Middle East. Burston before leaving Australia, pointed out the advantage of the appointment of a D.M.S., but the Chief of General Staff, General Sir Brudenell White, did not agree, believing it was better to consider the possibility of the D.G.M.S. and other senior officers being sent overseas at a later date. In November Downes prepared for the Cabinet a memorandum describing the Australian medical organisation in Egypt in 1916, based on the account given in the Medical History of the 1914-1918 war the second volume of which had just been published. This memorandum drew attention to the improvements which had followed the appointment of a D.M.S. in 1916, and con-

tained a recommendation that the precedent should be followed. General Stantke, Adjutant-General, proposed to Downes that he be appointed D.M.S., and on Downes' demur asked if he was willing to go overseas. Thereupon Downes was appointed to the oversea post but no public announcement was made. Actually Blamey had already appointed Burston, and there was naturally a feeling in the Middle East force that he, who had built up the medical service there successfully, should be selected to control it. In the beginning of March 1941 Stantke personally informed Downes that he was to be appointed as Inspector-General of Medical Services and Maguire was to succeed him as D.G.M.S. This appointment was made at ministerial level, by direction of Mr Spender, Minister for the Army, and without consultation of the Military Board. Maguire accepted the appointment conditional to his having a stronger position with the Adjutant-General than had been accorded to Downes. Actually the status of the medical services was much more satisfactory in the Middle East than at home, for General Tomlinson, D.M.S. of the British Force dealt direct with his Commander-in-Chief, and General Burston with General Blamey. Maguire was told that he would attend meetings of the Military Board when medical matters were discussed, but the real position was little altered. Indeed on one occasion Maguire informed the A.G. that he would resign if an important matter which had been opposed was not sanctioned. Difficulties arising between the D.G.M.S. and the A.G. arose partly from questions of personality and partly from the reluctance of some staff officers to regard the D.G.M.S. as the responsible technical adviser on medical affairs, an attitude which complicated administration and tended to cause delays. General Downes after appointment as I.G.M.S. in 1941 visited the chief military centres in Australia, and, accompanied by Major C. H. Fitts as staff officer, travelled by the hospital ship *Oranje* to Malaya via Darwin and the Netherlands East Indies. He then visited Egypt, Palestine and Syria, Sudan, Eritrea and Abyssinia, and went to India and Ceylon, returning to Melbourne in October 1941. His reports covered most of the subjects of importance which affected the medical services of the A.I.F.

While Downes was D.G.M.S. the medical services had been greatly expanded and important organisations within the Services were developed. Significant changes were the developments relating to induction of recruits into the army, and the early steps leading to the inevitable growth of women's services.

At the outbreak of war the Australian Army Nursing Service was the only army women's service in existence in Australia, with only a few nurses on the reserve. In the middle of 1941 the Australian Women's Army Service was formed, which released many men for service in forward areas. The organisation of women's service in the navy and air force will be dealt with in a later volume. The formation of these services with large numbers of women in all the military areas in Australia raised special problems of recruitment, accommodation and medical care. Medical examination of women recruits was based on the general lines

laid down for men, but carried out as far as possible by women doctors, usually working on a part-time basis. Voluntary aids were also enlisted as a necessary and integral part of the medical services. A new handbook had been written for their use by General Downes just before the outbreak of war. These detachments were raised under the tutelage of the St. John Ambulance Brigade and the Red Cross Society, separately or in conjunction, in different States, and were regarded by the D.G.M.S. as a valuable source of assistance to the medical services. Two unpaid members were allowed to proceed overseas with the 2/2nd A.G.H. but it was some time before the Cabinet could be convinced that the voluntary aid detachments should be paid and accommodated for the purpose of special service with the army. At first approval was sought for the employment of voluntary aids in camp hospitals in Australia, where they immediately established themselves as invaluable. It seems difficult now to imagine that there was even a minority of people, some not uninformed, who doubted whether nurses were needed in camp hospitals, or whether voluntary aids were needed for military duties. The V.As. were found of great value too in all the lines of communication areas in Australia, and in June 1941 approval was given for 800 to be enlisted for oversea service. The first draft proceeded overseas in October 1941, but the altered military situation prevented further detachments from serving in the Middle East, except those who served with the 2/12th A.G.H. in Colombo and in hospital ships. Expansion of this auxiliary service continued: a controller, Miss K. A. L. Best, was appointed to the staff of the D.G.M.S., and an assistant controller to the staff of the D.D.M.S. of each military area to coordinate the services, and the range of duties performed was greatly increased. Voluntary aids as well as working as nursing and dental orderlies and operating room attendants were posted as clerks, messwomen, laboratory assistants, dispensers, radiographers, telephonists, tailoresses, storekeepers, laundry workers and general duty women. This growth in their activities coincided with the greater needs of the period beginning at the end of 1941, when Japan entered the war. At this time too a large part of the A.I.F. returned to Australia, and with the great changes imperative in general army organisation it was natural that the voluntary aids should be enlisted into the army and form a special service. There were two distinct types of service rendered, part-time and full-time, both valuable, and it was obvious that women carrying out these specialised forms of service in the army should belong to a separate service.

Another offshoot of military activity was the V.D.C. (Volunteer Defence Corps). This body arose from the desire of veterans of the 1914-1918 war to offer themselves for emergency service and for special training in defence, in passive air defence, or in signals or medical or other technical work. The army medical services were not directly concerned with this body as an organisation, but individual members of the A.A.M.C. gave their time to teaching first aid and other procedures and to field training which might equip members of the V.D.C. in emergency for work in home service medical units. Occasionally difficult problems of

compensation arose when members during training or field work became ill or were injured. Civilian doctors attended such men and in the adjustment of remuneration for these services members of the consulting staff of the D.G.M.S. acted as assessors.

MEDICAL COORDINATION IN 1941 AND 1942

The demands likely to be made on all medical services were increased when the war against Japan began in December 1941. At the beginning of 1942 the procedures for obtaining medical officers were working smoothly, though with occasional difficulties and misunderstandings. The question of allotment to the A.I.F. or to the C.M.F. (Militia), which was quite outside the province of the Central Medical Coordination Committee, gave occasional trouble. This committee having delegated to the State committees the task of obtaining as many medical officers as could be spared from civil work for the army, navy and air force, had not campaigned to obtain men for home service. This was not necessary, as the *Defence Act* gave power to call up medical practitioners of appropriate age groups for this service, officers on the reserve could be used for the same work, and there was little difficulty in employing doctors not within the compulsory age group for short periods of home service. If in fact such a campaign became necessary the central committee would initiate it through the State committees. Misunderstanding sometimes arose too due to a lack of understanding that once an officer was allotted to a medical service the service director alone was responsible for the manner of his employment.

In February 1942 a Premiers' conference was held, at which some of these matters were discussed. The question of registration of nurses was also brought under review, and General Maguire expressed the opinion that it would be best if nurses, dentists and technicians as well as doctors were called up for service and civil needs. The D.G.M.S. also brought the altered situation before a conference of Commonwealth and State Ministers. He pointed out that over 100 doctors had already been replaced by civilians in the army, thus effecting a considerable saving. Registrars and adjutants in general hospitals had been replaced by experienced laymen, bearer officers were no longer appointed to field ambulances, their work being taken over by men highly trained in first aid procedures, medical officers in hygiene sections were replaced by highly trained public health inspectors and work in some technical specialties such as entomology and bacteriology was being done by scientific technicians, instead of medical officers. The shortening of the medical course had been effected at the Universities, and women graduates were being used for certain army appointments. At the same time great care was being exercised in calling up doctors for military work: they were being used part-time wherever possible, and if a serious emergency occurred final year medical students could be employed in certain capacities under supervision. The D.G.M.S. emphasised that, while the State Medical Coordination Committees controlled the pool of doctors, supplying them to the

services and the civil community as required, the central committee as the central authority should have full executive powers in the distribution and employment of medical men. At a meeting of the Central Coordination Committee this view was shared by the deputy chairman of the central committee, Sir Alan Newton, and at a meeting of a special sub-committee a scheme was drawn up for the establishment of an executive medical coordination committee. In addition the question of medical equipment was reviewed.

The closeness of the Japanese war to Australia had introduced another problem. The various organisations concerned with air raid precautions and some private firms had made panic purchases of medical equipment, and the need for a coordinating officer was felt. At the end of 1941 the appointment of a medical director of home security was suggested to the Minister for Home Security, but he deferred action.

Dr Cumpston was then asked by the central committee to make a visit to the various States and ascertain the position in each. On his return he made a comprehensive report. This pointed out the different legal position in each State with regard to the maintenance of essential services, but recognised the aim of all the State Governments to cover all medical needs of the community. The Commonwealth had endorsed the necessary powers of the States by the *National Security Act*, which could be further invoked should further action be demanded. The distribution of doctors available for civil domestic practice was on the whole satisfactory, and the arrangements seemed likely to withstand the strain of full mobilisation, but further organisation was indicated for emergency purposes, should war actually come to Australian shores. The doctors in private practice were working very hard, and in some instances, were showing signs of strain. The medical attention given to the public was, in Dr Cumpston's opinion satisfactory. Strain was most evident in Western Australia where the medical resources were fully exploited. In the event of a raid or other hostile action the resultant emergency would divert numbers of doctors carrying on over-busy practices. Therefore a Commonwealth-wide emergency organisation was suggested that a mechanism for equalisation of effort might be possible. Though the balance was delicately held in some States between service requirements and civil needs, coordination was then working well in all States.

The altered war situation had introduced several new factors. For example, more prisoners of war were being held in camps, calling for more administrative assistants; the American armed forces were arriving in increasing numbers, again involving more work in administration, and for a time more call on hospital accommodation and care; the flow of civilians from evacuated enemy-held countries was increasing, and the risks of disease were thereby enhanced. In each State there were committees for civil defence in addition to the coordination committees under the Department of Defence. These separate committees had different members and the coordination between them was not always very close. The presence of some members on both committees was helpful in this

regard; cooption was a means to this end, and was used more in some States than others. Practical cooperation had been achieved in most instances by mutual understanding, but the difficulty of having two bodies representing different authorities remained.

Dr Cumpston suggested that the State coordination committees should appeal to doctors to serve in an emergency under stated conditions or unconditionally, that civil practices should be more economically controlled by introducing a geographical zoning for visits of doctors to patients' homes, and prescribed hours at prescribed places for treatment. He further suggested that a roster of doctors should be drawn up who would be willing to act in an emergency on a salaried basis, and pointed out that a compulsory basis for emergency service might become necessary. After discussing the situation in the light of this report the full central committee on 22nd February 1942 agreed to the establishment of an emergency medical service under the direction of the Department of Health. After the meeting the representatives of the British Medical Association and Air Vice-Marshal Hurley put forward the view that the members of the medical profession might look askance at the method of administration of such a service, and might regard it as a thinly veiled introduction of permanent nationalisation of medicine as a war measure. In view of this a further meeting was held on 8th March 1942 at which it was agreed that the E.M.S. would be established under the general direction of the Minister of Home Security, but that the actual administration should be undertaken by the Director-General of Health as member of the central coordination committee. This step was taken because the Department of Home Security would terminate with the cessation of war. One possible drawback was seen, that the administration of this service might revert eventually to the committee itself.

EMERGENCY MEDICAL SERVICE

The necessary regulations governing the E.M.S. were gazetted on 26th March 1942. These provided for the actual administration by State committees through executive officers; these positions were filled by the deputy chairman, who had done excellent work in each State, having already made arrangements for caring for the civilians in an emergency and for the needs of the air raid precautions organisation. Along these lines the organisation was shaped, and a complete account of the practice and procedure was drawn up. Various amendments were made in the regulations, which were consolidated in statutory rules. On 20th April 1944 the administration, which had been placed previously under the Minister for Defence, was transferred to the Department of Health. The Director-General of the Emergency Medical Service was empowered to give effect to the decisions of the Central Medical Coordination Committee in relation to the work of the E.M.S., and to give directions to a State committee. Assistants to executive officers were also appointed in most States. Pay and expenses for part-time and whole-time service in executive work was based upon equivalent military scales. Allocations of

medical practitioners for naval, military, and air force requirements were arranged through the State executives, and where consultants were desired for special duty they were made available by agreement with the senior representatives of the services concerned. An emergency civil medical practitioner service was organised, consisting of volunteers, and others whose services were called upon in pursuance of the regulations. No barrier was raised to any member of the E.M.S. serving in a force outside Australia. Arrangements were also made to draw into the organisation those doctors who after service with the forces had returned to civilian practice. Assignment for duty in the E.M.S. consisted of the following categories: continuation with present work; part-time posting to hospital on first aid duties; and full-time work during an emergency or as a principal or *locum tenens* carrying out civil practice or as an E.M.S. practitioner in a country area on a salaried basis. Every medical practitioner concerned was duly notified of these provisions, and if called upon to carry out any specific duty, could appeal to the central committee. Rates of salary for a *locum tenens* or full-time service were determined: in certain areas a special district allowance was made in addition. These were in accordance with the rates of pay and allowances payable to medical officers of the Commonwealth Department of Health. Arrangements were also made for the necessary accommodation and equipment for practice under direction by the E.M.S., and standard charges for various medical and surgical procedures were drawn up.

COORDINATION OF DENTISTS

The coordination of medical practitioners for war service aroused interest in the dental profession. A suggestion was therefore made that a dental coordination committee should be established, separate from the Central Medical Coordination Committee, and consisting of the senior dental officer from the navy, the army and the air force, a representative of the Federal Council of the Australian Dental Association, and a representative of the State councils of the same body for New South Wales and Victoria, under the chairmanship of the chairman of the C.M.C.C. The central committee decided not to recommend such a dental coordination committee, feeling that there was a danger that the action taken by this committee might be opposed to the policy of the service directors of the navy and air force, who were only represented by senior dental officers. An alternative was proposed and accepted, which provided for the appointment of a dental sub-committee of the C.M.C.C., which could make recommendations to the central committee. As the committee had previously restricted its ambit to medical practitioners a change in the regulations was now necessary in order to allow for the coordination of all "medical personnel". This was effected on 26th March 1942. It was evident as soon as the sub-committee met that the service demands for dentists were much less than the call for medical practitioners. In Australia 5,000 dentists were registered, and of these only 500 were required. Therefore there was no need at that stage to introduce regulations similar

to those needed for the coordination of doctors. Honorary dental advisers were appointed to each State coordination committee whose function was to advise through each State committee concerned the calling up of dentists for service. Thus a system of voluntary coordination between service dental officers and representatives of the civil dental profession was effected. This appeared to be a more generally acceptable method than a more thoroughly controlled mechanism, since it avoided any suggestion of the beginnings of nationalisation of the dental profession. A real difficulty was found in providing dental mechanics. There was then a shortage in civil practice; therefore steps were taken to train mechanics in the services, and the Director of Manpower was approached so as to ensure that qualified mechanics would not be allowed to enlist in the forces.

COORDINATION OF PHARMACISTS

A sub-committee of the central committee was formed to advise concerning the need for control of pharmacists. Some States wished regulations to be gazetted for the purpose, but the pharmacists themselves, like the dentists, wished to avoid control by regulation if this was possible. A *questionnaire* was drawn up for issue to all pharmacists, but without an enabling regulation there was no certainty that the necessary information would be obtained. Advisory sub-committees were recommended in each State to advise the State committees, and the Director of Manpower was asked to exempt indentured pharmaceutical apprentices from being called up in December 1942. There was considerable delay before the desired regulation was gazetted. In May 1943 the Director-General of Manpower agreed to take steps to utilise advisory committees for control of pharmacists entering the services, and State committees were asked to submit information about any who might seem unnecessarily called up for service.

COORDINATION OF NURSES

The demand for nurses was so great both by the services and the civil hospitals that the central committee in 1942 agreed that the nursing profession should be controlled by regulations similar to those gazetted for the Emergency Medical Service. The administration of this was originally planned to be carried out by the Department of Health, but by reason of the bulk of work demanded it was met by an expansion of the secretariat of the central committee. It will be remembered that the original coordination plan included nurses, voluntary aids and physiotherapists, but was restricted later to medical practitioners. Now the scope was widening again. In September 1942 a sub-committee of nurses drew up a report which recommended control of nurses on a Commonwealth basis, under the Central and State Coordination Committees. It was also suggested that a salary scale for nurses should be fixed. Early in 1943 General Burston, who as chairman of the central committee had had interviews with various authorities, reported that the position needed reconsideration. The mechanism for controlling the nursing profession was

already in the hands of the manpower authorities, and, although this lay body had drawbacks in the control of a profession, with appropriate help a satisfactory form of control might be achieved. The Director of Manpower agreed to consult the C.M.C.C. and therefore, with this safeguard of consultation on matters of policy, the committee agreed to control by manpower. Dr Cumpston was empowered to negotiate with the director; it was thought especially important that general nurses and especially obstetric nurses should be distributed evenly and fairly through the civil community, and that such powers as might be necessary should be exercised, but that a nurse should not be refused permission to enlist without good cause. These arrangements were made satisfactorily and State advisory committees were set up which included a representative of the nursing services of the armed forces and of the nursing profession.

MEDICAL EQUIPMENT CONTROL IN 1941 AND 1942

Service requirements of medical equipment imposed more strain on the mechanism of supply after the end of 1940, with the growth of the I Australian Corps and its committal to action. During 1941 the retreat of the force from Greece resulted in an almost total loss of the medical equipment of the 6th Division, including that of two hospitals, one of 1,200 and one of 600 beds. Before the end of March 1941 all initial equipment had been supplied for four divisions, four casualty clearing stations, eleven hospitals, a hospital ship and additional medical units needed for expansion of the growing corps. The unexpected diversion of troops to England had made necessary replenishment of part of the stock of two advanced depots of medical stores, and also replenishment of the equivalent of half an advanced depot for the A.I.F. in Malaya. In addition to these were stores for general hospitals and camp hospitals for troops in Australia, then approaching 200,000 in number, and equipment for medical units called up for full-time duty, for troops in isolated ports. Great delays had been experienced through complicated Contracts Board procedure, and the routines of authorisation, ordering and approval. Some types of equipment previously handled by ordnance had been taken over by the medical services with a view of expediting their supply.

The organisation and stimulation of production were of course not an army function, but the Medical Equipment Control Committee with the cooperation of the Department of Supply had brought about admirable cooperative organisation of the surgical instrument and drug trades, set up a system of continuous record of quantities of all essential and important medical equipment, built up greatly increased reserves, established relations with buying organisations in England and America, which in association with the relevant Commonwealth Government departments, increased the ease of supply, and had enlisted the aid of the medical profession in the cause of economy. General Downes, writing to Major-General Stantke, stressed the further need for a long range programme of supplies, which would assist manufacturers and supplies and for expedition of the building up of further reserves necessary for mobilisation.

In July 1941 a Treasury circular was distributed dealing with the importation of goods from the United States of America. Separate estimates were now asked from all war departments for all goods which it was expected would be obtained under the *Lend-Lease Act*. An accounting procedure was also laid down. Orders placed in America were of two classes, lend-lease procurement and direct orders involving dollar expenditure, and procedures were adopted to deal with these on merits, owing to dollar stringency. Delays were apt to occur owing to incompleteness of information as sometimes received by the Treasury, and to complicated procedures in the United States administration.

It will be seen from the above that while needs for medical equipment were growing, avenues of procurement were increasing at home and overseas, though the complexities of procedures also increased and threw more strain on administration in Australia.

A summary of the work and policy of the M.E.C.C. at the end of 1941 may be made as follows: The committee had kept continual surveillance over returns of the stock position of essential items of medical equipment. These returns were regularly made by wholesale firms, and particular attention was paid to imported items and those which were scarce. It was felt that no rigid rationing could be instituted for medical supplies, as the demands were not predictable by reason of constant changes in the incidence of disease. Where it appeared wise to govern the sale of drugs, as in the instance of the sulphonamides, a medical prescription basis was found to be the most effective method. Where export was contemplated it was necessary to ensure that the items were in surplus supply. For example a Russian medical aid and comforts committee desired to purchase certain medical stores, and the M.E.C.C. decided to recommend gazettal of a regulation confining these items to those of which there was an exportable surplus.

Measures which had proved very successful were (1) the encouragement of wholesale firms to import and hold stocks of essential items, an example followed by the Defence Services, Government medical stores and the hospital buying associations; (2) increase in local production, helped greatly by the establishment of a surgical instruments panel, which had made a great difference to the position; (3) advisory relations with the Department of Trade and Customs concerning the advisability of importing or exporting certain items of medical equipment; (4) voluntary rationing instituted by wholesalers with the cooperation of the committee; (5) an economy campaign, which as already described had been very fruitful; (6) close cooperation between the services and the civil community so that the legitimate needs of the latter should have due consideration. A most successful procedure was the regular attendance of an officer of the M.E.C.C. at meetings of the Contracts Boards with the service equipment officers when tenders were being considered; (7) reserve supplies were kept of essential items which as a matter of policy were not to be drawn upon till all other supplies were exhausted.

Some difficulties were still outstanding. Surgical dressings, particularly gauze and bandages were scarce throughout the world; so too was yarn from which they were made. Both in Britain and U.S.A. the position was one of stringency. Suitable yarn was not made in Australia but samples from India were being examined for suitability. The committee at the end of 1941 still had three million yards of gauze, one million of which was reserved for use by the army. Syringes had been perforce imported from America, but suitable glass tubing was now being made in Australia, and the position was expected to improve. Production of syringes in Australia was in sight, but it was not expected to reach any quantity for several months. Syringe needles were now made in Australia, but only from imported steel tubing of which the committee held a small reserve. Quotas had been granted, but stocks were still awaited. Forceps of the Spencer Wells type were being made in Australia, the drop-forging of these and other instruments being done by the Newport Railway Workshops. Few skilled workers were available to finish the drop-forgings after their delivery at instrument factories, and production could not as yet fill the demands of the services.

In 1942 important additions were made to the staff of the M.E.C.C. Colonel F. H. Moran, who had joined the staff in 1941 became the Deputy Chairman and Executive Officer of the Surgical Instruments Panel. In May 1942 Mr Kent and Mr Jewkes were released for other important work, and Mr F. W. Ritchie, on loan from Parke Davis and Company became secretary. Mr E. P. Ackman reinforced the surgical instruments panel staff, and Dr C. V. Mackay became the committee's chief executive officer.

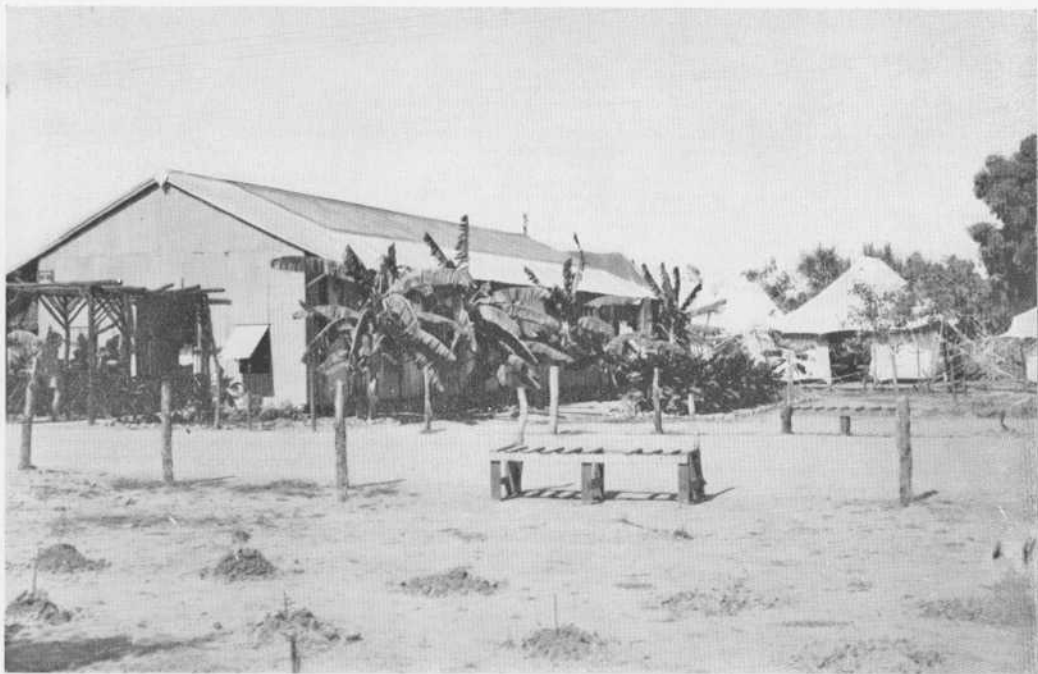
The committee met only at infrequent intervals, and its executive work was carried out by practically daily consultations between the chairman and the members associated with the various departments and sub-committees. The medical services sent their equipment officers to attend committee meetings, and close liaison was maintained with them. The Director-General of Health was kept informed of the committee's work, and this was reported also to the National Health and Medical Research Council, thus ensuring contact with the State Director of Health. Subsidiary committees were found essential to cope with the diversity of the main committee's work. These were (a) the Surgical Instruments Panel, which included representatives of all the armed Services (b) the committee of Scientific Liaison Officers, which correlated scientific research with commercial production and included members from the Universities of Sydney, Melbourne and Adelaide, linking up with scientific workers throughout Australia (c) the Pharmaceutical Advisory Panel under the direction of Dr B. L. Stanton and (d) Federal Committee of Wholesale Drug Firms. The work of these committees was of obvious importance. The production of surgical material in Australia was of great significance in the work of all medical practitioners in and out of the services. The local manufacture of new drugs or drugs not previously made in Australia was only made possible by the labours of scientific workers. By

1942 no less than twenty-two drugs or types of drugs and other scientific equipment had been examined, and where possible initial steps taken towards production. The pharmaceutical panel had produced an *Australian War Pharmacopoeia* which was distributed throughout Australia. While conforming to all requirements of wartime economy this offered therapeutic substances or combinations for all ordinary purposes. It was designed to supersede all other pharmacopoeias for the duration of the war. The scientific and therapeutic aspects of the committee's work was firmly reinforced by the wide administrative network which linked departments, manufacturers, distributors and consumers. In one of its reports the committee drew attention to the many steps that were necessary before a drug not previously made in Australia was available for consumers. A method having been evolved by the scientific workers, negotiations were opened with a firm for its production, priority obtained from the works priorities sub-committee for the erection of a factory, and approval of the Department of War Organisation of Industry, the Ministry of Munitions persuaded to release materials and plant, and the manpower authorities workmen, the Department of Supply and the Service Medical Equipment Branches informed, steps taken to remove the item from the lend-lease list when production reached the point of meeting requirements, and arrangements made with the Department of Trade and Customs to refrain from approving imports from other sources. Finally the price-fixing Commissioner determined the sale price and the cycle was complete. An interesting side light on the efficiency of the modest organisation which controlled medical equipment is shed by a letter originally sent by a firm to one in another State, which said that

the M.E.C.C. is more helpful and manages its affairs in a more business like way than dozens of other wartime departments. We are fortunate that we are placed in the position where we have to deal so much with an efficient Government Department as the Medical Equipment Control Committee.

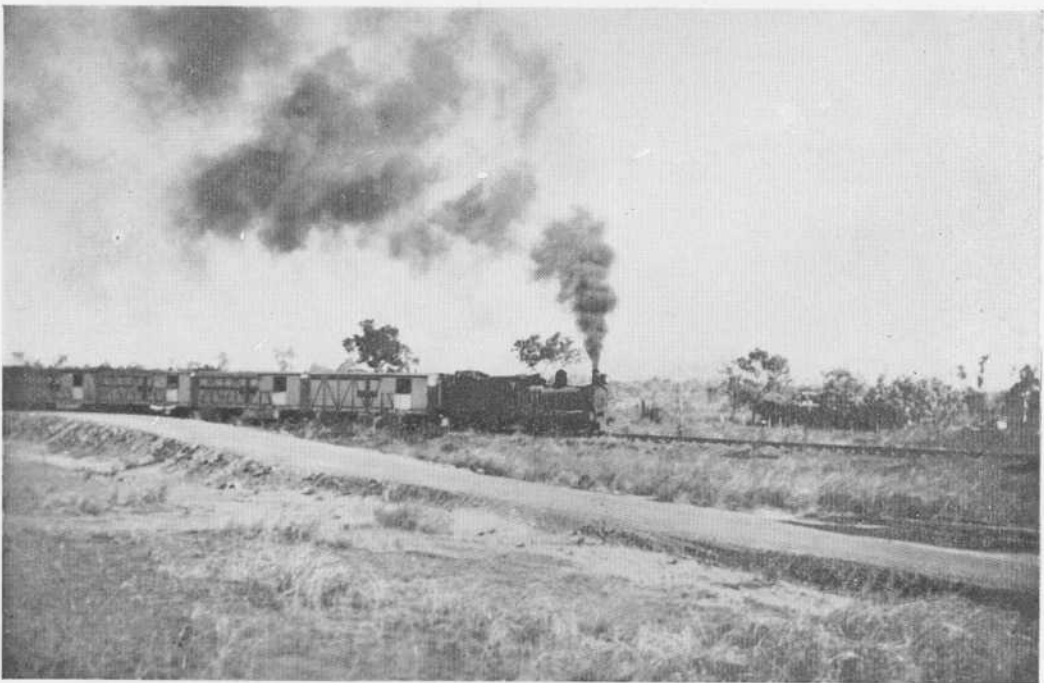
In the eighteen months following on 31st December 1940, a great increase was made in the stocks of material held in Australia and supplies available for the services and the civil community. Perusal of the drug list shows percentage increases amounting in most instances to several hundreds. The stocks of alternative drugs were also increasing considerably. The position about some proprietary lines was not so good, but was helped by the introduction of a system which reduced the innumerable differences in doses, containers and packages to a common factor.

Supplies of anti-malarial drugs gave anxiety. Quinine was largely in the hands of the Japanese after the close of 1941, and attempts to bring a large reserve from Java to Australia failed through an unexplained, though sinister incident, when this stock, after being loaded at a Javanese port, was unloaded at another port. General Burston as D.G.M.S. of the Army and Colonel N. H. Fairley, his Director of Medicine took prompt steps to accelerate production of atebirin and plasmoquine. Quinine was conserved by action of the committee; stocks were reserved for civil use, which was legally restricted to malaria.



(Australian War Memorial)

The 119th Australian General Hospital, Northern Territory.



Ambulance train Adelaide River, Northern Territory.



Concord Military Hospital.

(Department of the Interior)

Numbers of drugs made in Australia from 1941 onwards included specifics for various tropical diseases, such as amoebicides, vermifuges and schistosomicides. Much of the preliminary work involved was carried out by the Australian Association of Scientific Workers, and expansion of the manufacture of industrial chemicals must also be given due credit, which made many processes possible and enabled laboratory work to be turned to practical account. Some of the sulphonamides, such as sulpha-guanidine, were now being produced in Australia, and Professor Macbeth in Adelaide evolved methods for making heterocyclic derivatives of sulphanilamide. Eventually sulphamerazine was chosen for Australian production, and was the subject of special anti-malarial research, as well as being widely used for the same purposes as sulphadiazine which had hitherto been imported. Surgical dressings were still in short supply in 1942, and stocks were not at the desired level, though rising. To help the position the committee issued an order restricting gauze material entirely to medical and surgical uses. Negotiations with the cotton control committee were successful in increasing the allocation of Australian yarn to Australian manufacture. This was expected to increase the annual output to three million yards. Care was also taken that passive air defence, a new responsibility arising from the entry of Japan into the war, did not absorb an undue share of available stocks. Adhesive plaster was now being locally made, but rubber shortage compelled its rationing.

Surgical instruments were now in 1942 being manufactured in increasing numbers: the annual output of the trades concerned rose in value from £5,000 to £300,000. All rubber appliances were of course strictly controlled, and the committee felt bound to recommend that rubber be employed only for essential medical purposes. The rubber position was worse than the public knew at this time.

Dental requirements were in the main met locally, but certain essential items such as artificial teeth, hand pieces and burrs were imported. Stocks of some types of artificial teeth were almost exhausted, and further supplies were being urgently requested under the terms of lend-lease. The introduction of acrylics together with their manufacture in Australia was of assistance in the saving of rubber. Pathological and radiological supplies were improving, though the position of X-ray tubes was very serious, and attempts were made in 1942 to place indents in U.S.A. to provide for the needs of 1943 and 1944. Stocks of film chemicals and veterinary supplies, helped by the new manufacture of some veterinary drugs, were then satisfactory. The committee had added to the "nest-egg" drugs it held in reserve, and on the outbreak of war with Japan dispersed this and other valuable stores over various centres in Eastern Australia to obviate risk of loss by enemy action.

In the closing months of 1942 the committee was able to feel some satisfaction that all essential work using medical supplies had gone on without at least serious interruption. Three periods could be distinguished in looking back on the past. The first extended to the end of 1941; during this period supplies from overseas, though restricted were reasonably

adequate. The second stage began late in 1941, when lend-lease began. At very short notice the committee had to revise its procedure and plan a two years' programme of requirements which could not be satisfied locally. This stage was one of intense activity which necessitated the coopting of a huge staff of voluntary workers in order to compile the information required by the Government within a brief specified period. More will be said of this stage presently. It was followed by the third stage of complete Government control, when consent had to be obtained from the appropriate authorities before export of essential medical equipment was permitted. Goods derived from lend-lease could not be exported.

One result of these changes was that the rapid rise in stocks accumulated ceased, and the committee then aimed at maintaining a steady level. The future of medical supplies obviously depended not only on the continued production of all possible goods in Australia, but also the smooth operation of lend-lease. The operation of lend-lease was in fact not always free from trouble, and simplification was found necessary. Even in the sphere of medical equipment, the necessary expansion of production in the United States to meet needs of the Allied Nations created great difficulties. In May 1942 advice was received that most of the drugs contained in the estimates drawn up by the committee would be received in progressive deliveries from June onwards. These estimates involved great labour in their compilation, which demanded over 20,000 separate entries. However, none of these goods arrived, and on 17th August 1942 a cable from Washington stated that a sharp distinction was observed between military and civil requirements, much more attention being paid to the former. As it had been impracticable for the equipment committee to separate all items in this way at short notice, the Division of Import Procurement agreed to send a cable to Washington protesting against further delay. Information came in reply that orders were being placed which it was hoped would be filled before the end of the year. For further orders a special procedure had to be followed which included review of the British Ministry of Supply Mission, clearance by the War Production Board, procurement by the Surgeon-General, and check by the International Supply Department of Foreign Requisitions. This last step involved analysis for content of raw materials. Before goods could be assigned stocks were examined by the Surgeon-General's Department, and consideration given to the requirements abroad in special regard to the strategic situation. A further rule laid down that lend-lease material, if not loaded to ships within forty-five days of notification of availability was repossessed by the United States War Department, when steps had to be taken to obtain reassignment. The committee found it advantageous to place orders also with the United Kingdom for such items as were available from there. This, though not the usual procedure with goods indented under lend-lease, was approved by the Ministry of Supply, through the High Commissioner in London, allowing some British preparations to be obtained, thus removing them from lend-lease.

Rationing was still used as an economy measure, by controlling output, limiting usage on a prescription basis, and also by voluntary limitation in collaboration with wholesale drug firms. It may seem curious that one of the drugs subject to voluntary rationing was aspirin; though freely available to the services, to hospitals or on medical prescription, it was only sold in limited quantities to the public. This was necessary to control the supply of acetic anhydride, the only imported raw material in its manufacture. Though exports were now drastically curtailed, exceptions were made for New Zealand, with regard to essential drugs. Some perplexity was caused by proprietary preparations, some of which afforded an avenue for unnecessary wastage of scarce components. This was solved by invoking a *National Security Regulation* which required all formulae of patent and proprietary medicines to be revealed, and gave power to prohibit or limit production according to the need. This was properly a function of the Department of Health, but for this purpose was discharged by the chairman of the M.E.C.C.

When the year 1942 closed the work done in the earlier years laid a sound foundation for the heavier trials imposed by the Japanese war. A notable feature was the cooperation of all departments, both in administrative and technical matters. In some of the purely scientific work necessary to initiate production of drugs in Australia most of the hard work was done by a few, but in other instances the combined efforts of numbers were needed, often with the great assistance of the National Health and Medical Research Council and the Council for Scientific and Industrial Research. The Plant Industry Division of the C.S.I.R. began investigations early in the war associated with the cultivation of drug-producing plants, and the utilisation of indigenous plants. The early stages of this work, described in Chapter 3, were promising but had not reached finality in 1942 because of a certain lack of coordination of laboratory, botanical and horticultural work. The laboratory investigations required more facilities than were available in the early stages, but under Professor R. D. Wright in Melbourne the plan took shape. The scientific position with regard to chemicals was summarised by Professor E. Ashby, the Chief Scientific Liaison Officer in a report on the 12th June 1942. Work was then in progress on a number of substances in various University laboratories, in attempts to initiate or improve methods of manufacture. These included colloidal kaolin, magnesium trisilicate, plaster of Paris, formaldehyde, ammonium carbonate, tartaric acid, citric acid, coramine, adrenaline, chlorine, carbon tetrachloride, chloroform, aniline needed for sulphanilamide production, paraldehyde, some of the barbiturates, gentian violet, and foudadin. Research was also being carried out on atebtrin, though there was no intention of attempting the task of commercial production in Australia.

OTHER CIVILIAN MEDICAL SERVICES

The defence of Australia was inevitably wrapped up in the significance of the mainland as a large military base. The throwing of vast and

increasing forces into the Pacific war by the United States of America made joint efforts necessary both in civilian and military undertakings. On 17th February 1942 the Australian Cabinet established the Allied Works Council, under the direction of E. G. Theodore, to meet the demand for construction of defence works and to give full scope for the forces and equipment arriving from America. Cooperation between Australia and America was ensured by the setting up of an administrative planning committee, whose decisions were implemented by the Allied Works Council. Then, to cope with the demand for manpower the Civil Constructional Corps was formed by *National Security (Allied Works) Regulation*, gazetted 14th April 1942. This body enrolled 53,518 men in the carrying out of the projects committed to it, and special arrangements were necessary for medical attention. Over the period of the existence of the C.C.C. 132,000 men were medically examined, placed in appropriate categories and given treatment when necessary.

A north-south road was completed to link the Northern Territory with South Australia, many other important roads were built, and airfields were created and extended. Medical planning was called for in each State, and by December 1942 greater coordination was needed under a Director of Medical Services for the A.W.C. Dr H. Leighton Kesteven, at first Chief Medical Officer for the C.C.C. in New South Wales, was appointed as Director for the Commonwealth.

Every project employing over 100 men had medical services arranged for the staff. The considerable distances often called for the installation of radio-telephones between road camps, arrangements were made for evacuation for all projects, and medical attention was provided by civilian practitioners at strategic points on agreed terms. To illustrate the magnitude of the problem of caring for these men, we may note one project, a road 431 miles long in North Queensland (Duaranga to Charters Towers), on which 2,380 men were employed, ranging in age from eighteen to sixty years. A special hospital of thirty-three beds was provided at Clermont, with four trained nurses and three orderlies, and all medical and surgical facilities. Where special investigations were necessary these could be provided in any area by sending men to centres where these were available. Deputy directors of medical services were appointed in New South Wales, Queensland, Victoria, and an assistant deputy in North Queensland. In all twenty-two doctors, thirty-seven trained nurses and fifty-three orderlies were employed in this work. Men who had been in contact with tuberculosis or whose clinical symptoms were suspicious, especially if they were going to the Northern Territory or North Queensland, were radiologically examined. Those employed north of the tropic of Capricorn were also blood grouped. Some of the men in the C.C.C. volunteered, some enrolled on the job, some were called up for service. All men were vaccinated and inoculated against tetanus and the enteric infections. The discharge rate was naturally high in such a force, medical unfitness being the predominating reason. Up to February 1945, 16,577 were discharged as medically unfit out of a total of 59,163.

At this time too military occupation of certain areas, such as the northern parts of Australia, in particular the Northern Territory was accompanied by some shift of civilian population, and for these adequate medical supervision and treatment were necessary. The subsidised service of the "Flying Doctor" organisation, a civilian organisation due to private initiative and enterprise, was during the pre-war years a model and an outstanding achievement. In the Northern Territory arrangements were made in June 1942 to provide in-patient and out-patient treatment by a medical officer who would also act as Flying Doctor when required. The Commonwealth Department of Health on its part undertook to supply an aeroplane and pilot stationed at a central point such as Daly Waters. The medical health officer at Darwin was called up for army duty, but it was agreed that he should still be located at Darwin and keep in direct touch with the Director-General of Health about matters relating to civilians, such as quarantine and the disposal of cases of leprosy and other conditions of local importance. Malaria was occasionally discovered amongst aborigines, and both chronic and acute fulminating tuberculous infections were also found. A special problem occasionally arose which was on the borderland of service and civilian medicine. When it became necessary to move a labour force from one area to another for a specific purpose, this purpose and the destination of the force were sometimes under the veil of security. This had drawbacks, for men living and working in a large civilised centre were frequently quite fit for average labouring work while in their home environment, but they could not always adapt themselves to the no doubt adequate but very different conditions of working camps. Such men could be largely eliminated from a labour force by an experienced examiner, provided he knew the conditions under which they would be expected to work. This is part of a larger question of the estimation of medical fitness which can often only be made if sufficiently full information is available to the examiner.

PHYSICAL STANDARDS FOR SERVICE

General Maguire, on assuming office as D.G.M.S., reiterated the advice of his predecessor concerning the importance of enlisting only fit men for military service. Attention has been drawn in previous chapters to the numbers of men who proved unfit to cope with the life of a soldier on active service.

In 1941 the classification of class I, IIA, IIB were still official in Australia, but later amendments altered this and substituted the A, B, C, D, notation. The 1941 classification had added a further category class III which was designed for labour units in the Commonwealth Military Forces and permitted relaxation of the usual standards for vision and hearing, allowed acceptance of men with controlled herniae, and painless kyphosis or scoliosis, and omitted previous clauses concerning cardiac irregularities and asthma. The A, B, C, D notation defined the classification as follows:

A1. Medically fit for all duties.

- A2. Medically fit for all duties for which the particular disability is not a bar. (Such disabilities were entered in pay book or record of service book.)
- B. Medically fit to carry out certain duties which require only restricted medical fitness. These duties were shown in war establishments.
- C. Temporarily medically unfit (the estimated period of unfitness was to be stated).
- D. Medically unfit for military service.

In the instructions issued on 31st January 1943 the minimum permissible height for recruits was 5 feet 0 inches, and the minimum expanded chest measurement 32 inches. No recruit below a height of 5 feet 4 inches was accepted unless of good physique and judged capable of carrying ordinary equipment (about 60 lbs.) and doing ordinary military work.

Visual standards required for class A1, 6/18 with each eye or 6/12 with one eye and 6/36 with the other, in each case without glasses. For classes A2 and B these standards were accepted with the help of glasses. A recruit with one eye or with strabismus and vision of less than 6/6 in the defective eye was not accepted in a higher category than A2. The standard for hearing was amended to allow acceptance of men who could hear a strong whisper with each ear at 15 feet for A1, or hear ordinary speech with both ears open at 15 feet for A2, and at a distance of 5 feet for class B. A most important proviso was that a man required for a special position but not conforming to these standards had to be examined by an otologist to determine if his lesion was progressive. Final decision was made by the D.D.M.S. of the area or a delegated officer.

The directions given to examining officers were more detailed in the instructions used in 1942 and succeeding years, definite guidance was given about specific disabilities, and more use was made of specialists in coming to a decision.

Difficulties still arose with regard to recruits called up for periods of universal service, who were often examined under sub-standard conditions by doctors who could spare only limited time from their practices, in which they were busier than ever. In a well organised recruiting centre, preferably in charge of and staffed by senior experienced medical officers, it was much easier to maintain a high standard of examination. The importance of leisure and thoroughness cannot be overstressed in this work; adequate inspection of each recruit is necessary, so too is careful examination of eyesight and hearing. Skimping of cost in providing facilities at the beginning was not an unimportant cause of invalidity thereafter.

In this connection too may be mentioned the value of a brochure of instructions for medical officers. This was officially published in March 1942 and contained an account of all routines in the duties of a unit medical officer, and all details of administration necessary for him to know, important details of methods of hygiene, and preventive medicine including such conditions as meningitis and psychiatric illness. Though

in theory all medical officers underwent specific instruction early in their military career, this was not always possible, and until schools of instruction were more fully organised as the army grew in size, this booklet supplied some needs not otherwise fully met. Among a number of other service pamphlets another which was of value at this time was the War Office *Memoranda on Medical Diseases in Tropical and Sub-tropical Areas* published in 1941.

During 1941 and 1942 the health of the general public remained satisfactory in Australia. From time to time there were outbreaks of specific infectious diseases in the civil community, such as meningococcal infections and influenza. Certain epidemic diseases appeared in the Services and among civilians alike, but neither morbidity nor mortality rates gave cause for alarm.

Shortages of civilian doctors became more apparent after the close of 1941. These matters are dealt with in the serial sections on coordination, as are also the organisation of an Emergency Medical Service, for which complete plans of practice and procedure were drawn up.

MEDICAL ASPECTS OF TRAINING

By 1941 camps were firmly established, standards of accommodation were reaching the desired level, and living conditions were on the whole good. Camp reception stations and hospitals were well equipped and routine procedures of prophylaxis and treatment could be efficiently carried out. Military movements sometimes interfered with schedules of training as was inevitable, and the A.A.M.C. rank and file were still frequently deficient in knowledge of their duties when they were sent overseas. The health of the troops in camp was good on the whole, though the preventable diseases still occurred as a reminder of deficiencies in hygiene.

The formation of armoured divisions in Australia gave rise to special medical problems. Light field ambulances were raised and training was begun in the light of the altered requirements of distance and transport. The Australian establishment of an armoured division included two brigades, a support group and divisional and non-divisional troops. Among the divisional troops were the medical services, headed by the A.D.M.S. with his two deputy assistants. There were three light field ambulances each of a strength of about 180, with seven medical officers, and possessing fourteen motor ambulances and thirty-six other vehicles. Each light field ambulance consisted of a headquarters and four self-contained sections. A light field hygiene section was planned to look after the sanitation of the division. Each of the four regiments in the support groups had a medical officer, and an R.M.O. was attached to other formations such as workshops and engineers. The principle of self-support was carried still further in that each sub-unit had its own first aid kit, and so too did each fighting vehicle. Each medical orderly carried a medical kit and a hypodermic syringe.

Ten motor ambulances were of the four-berth type, the other four carried two berths only, and were smaller and less conspicuous. All had light armour protection. The most difficult problems in evacuation of wounded were the rapid covering of distances which led the medical personnel well up into the battle zone, and the handling of casualties in armoured fighting vehicles. When the training of armoured units began many of these matters, including the design of vehicles were experimental. Research was proceeding in Australia on the mechanical and physiological aspects of armoured fighting vehicles, under the general control of Colonel C. H. Kellaway, and the effects of environment on crews were studied.

In the field different methods were tried to effect the removal of casualties from tanks without inflicting undue pain or damage on the injured men. It was evident that some effective method of administering analgesics must be used, preferably the hypodermic injection of morphine. After this first phase the rescued casualties were treated at the squadron collecting post, and thence removed to the R.A.P. by ambulance and on to the A.D.S. of the forward section of the light field ambulance. After treatment the wounded were taken to the clearing post at the M.D.S. It was obvious that this general plan was subject to constant change, and communications were made by radio-telephone to the R.M.O. and through brigade headquarters to the A.D.S. Training gave ample scope for cultivation of a high degree of efficiency in the medical services, rapid decision, a capacity to improvise and an aptitude for navigation. Exercises were held in the northern parts of New South Wales, and the lessons of hygiene were early impressed on the formation, when outbreaks of diarrhoea occurred more than once due to neglect of necessary precautions.

Later the 1st Armoured Division removed to Western Australia and became a well trained efficient body of selected men. Colonel H. C. Disher was amongst a number of senior officers who were returned to Australia for special duties in connection with home defence, and became the A.D.M.S. of the 1st Armoured Division. Later he was succeeded by Colonel R. H. Russell. Though much admirable work was done by this and other armoured units raised in Australia in the 1941-1942 periods, much of the training, medical and otherwise was never applied in the field, for with the return of the A.I.F. from the Mediterranean theatres of war the future of the armoured divisions was changed. The strategic and political picture altered with the coming of war to the Pacific, and except for a limited employment of armour in isolated instances in the islands this particular effort was largely dissipated.

EVACUATION OF THE SICK AND WOUNDED

Hospital Ships. With the involvement of the A.I.F. in serious if brief campaigns in the Middle East further arrangements for the return of sick and wounded to Australia were necessary. The 2/2nd H.M.A. Hospital Ship *Wanganella* was commissioned and the internal arrangements were completely remodelled for the purpose. Half the space of "A" deck and the whole of "B" and "C" decks were used for wards

for officers and men, and departments for medical and surgical specialties were provided. Two wards had swing cots, where the most seriously ill were nursed; other wards had two-tiered mobile cots. The air-conditioned operating theatre and adjoining X-ray department were completely equipped. This ship was ready at the end of July 1941 and sailed at the beginning of September, taking the 2/13th A.G.H. to Singapore and returning with invalids. The *Wanganella* normally carried 436 patients and had emergency accommodation for 150 more.

Meanwhile the new fast motor liner *Oranje* was being prepared for use as a hospital ship. On 4th February 1941 the Australian High Commissioner in London cabled to the Prime Minister in Australia that the Government of the Netherlands East Indies offered the use of this palatial 20,000 ton ship for service as a hospital ship. The *Oranje* had previously been reserved for service as a potential auxiliary cruiser, but now the N.E.I. Government proposed to give expression to their appreciation of the cordial relations existing between them and the Governments of Australia and New Zealand by manning, equipping and operating this ship at their own expense. The ship was to act under instructions from the British military authorities, but was operated by a Dutch staff. This generous offer was accepted, and a mission which included Major J. D. Galbraith as the medical representative, flew to Batavia on 28th February 1941 to arrange details of equipment and personnel. Conversion was carried out in Australia, and on 2nd July the ship was ready and left Sydney for the Middle East via Singapore. The medical staff of the *Oranje* was Dutch, but an Australian and a New Zealand officer were appointed to be O.C. troops, being responsible for discipline and for advice to the C.O. about treatment of patients. The appointment of Australian medical and surgical liaison officers was found to be a convenient arrangement. General Maguire, D.G.M.S., doubted if the general professional arrangements would work in view of the Australian attitude about the care of their own men by their own medical staff. On 7th June 1941 he commented that he concurred with the arrangements (referring particularly to the finality of the commanding officer's decision) "at the minister's expressed desire for international amity". Even with the appointment of tactful liaison officers he still regarded it as an experiment. Shortage of hospital staff in N.E.I. led to the provision of Australian and N.Z. medical staff (in proportion 60/40) with a Dutch crew and ship's officers. The first trip to the Middle East was made in August 1941, when 431 Australians were brought back to Australia under admirable conditions of comfort and medical care. Some 670 patients could be carried and 850 in emergency.

Difficulties occurred, chiefly of an administrative kind. The combined Australian-New Zealand War Establishment was recognised as a composite one, and worked harmoniously. Matters of discipline and leave were not so simple, as these were decided by the O.C. hospital, who had to surmount difficulties in language and of unfamiliar army rules. Where different viewpoints were found in technical matters these were

usually adjusted by the liaison officers. The costs of pay and allowances were borne by the N.E.I. Government until 7th March 1942 but after this date these were debited to the British Ministry of War Transport. A year later the Adjutant-General directed that the Australians should be withdrawn from the *Oranje* because all Australian troops had then returned from the Middle East, and medical personnel were then badly wanted in Australia. They were replaced by British officers. During the period when the *Oranje* was used for Australian invalids the whole military picture changed owing to the return of the A.I.F. and the tremendous convulsion of the Japanese invasion of the N.E.I., but this most generous gift to the Australian people gave many Australian sick and wounded transport to their home country under conditions of a high degree of comfort and technical skill. A point may be mentioned here with regard to the blacking-out of hospital ships. This was discussed at the end of 1941 in Singapore with reference to the *Oranje*, since attacks had taken place on hospital ships in some belligerent areas. The procedure adopted in northern belligerent areas was to show only the red cross and green lights, but no others, so as to lessen the visibility of the ship: these areas included the northern part of the Red Sea. Extra look-outs were maintained at switches to extinguish the red and green lights in the event of attack.

War with Japan introduced fresh elements into the problems of sea evacuation of the sick and wounded. When the greater part of the A.I.F. left the Middle East there were still commitments there for the remaining 9th Division and base troops, and there was a very confused and, unhappily, a rapidly deteriorating position in the Far East. At the end of 1941 no Australian hospital ship had called at Singapore since the *Wanganella's* last trip there on 17th September, but this ship had called at Colombo twice before 29th December 1941. Both the *Wanganella* and the *Oranje* had picked up men in the Middle East at Port Tewfik, in the same period. The staff of the *Manunda* were warned to be ready on twenty-four hours' notice after 25th December 1941. The A.D.M.S. of the 8th Division A.I.F. then involved in the desperate struggle for Malaya, again asked for a hospital ship to be sent to Singapore; it was unfortunate that this was not done.

Though this is anticipating later events to some degree it is convenient here to point out how the area which might require service from Australian hospital ships had expanded, reaching from Egypt to Malaya, thence through a long chain of islands to Rabaul, and including Darwin, and other northern ports on the Australian mainland. Further there was a possible danger in sending the *Oranje* into part of this battle zone.

The *Manunda* was ordered to sail from Sydney to Darwin, and arrived there on 14th January 1942. During a period of five weeks this hospital ship remained there, with its staff fretting at their inaction, and the forces in Singapore in great need of assistance, though the ABDA Command headquarters in Batavia signalled Australia on 12th February "Hold *Manunda* at Darwin until further notice".

Ambulance Trains. In 1941 more attention was paid to ambulance trains, as the need grew for transfer of patients between different hospitals, especially those in capital cities. In 1942 the need was even greater, and more consideration was given to the design and staffing of these trains. Trains were fitted up in all States, those running between Victoria and South Australia being a joint effort by the two systems concerned. Break of gauge between States was a troublesome archaism. General specifications were drawn up at army headquarters covering design of the cars and setting down all equipment. A train usually consisted of a staff car, a personnel car, an administrative car, a dining car, ward cars and a brake van. Ward cars were provided with upper and lower berths; a car carried thirty to forty or forty-five cots. Up to eight ward coaches were used in some trains.

BASE HOSPITAL ACCOMMODATION IN AUSTRALIA

In a previous chapter the troubled beginnings of plans for base hospitals in capital cities have been described. Though a comprehensive programme of hospital construction was submitted for ministerial approval on 21st November 1939 it was only on 10th July 1940 that a recommendation of the military board for multi-storey hospitals in Sydney and Melbourne was approved. These structures were additional to pavilion hospitals of 1,200 beds and 1,000 beds respectively. Pavilion hospitals were approved also for Brisbane and Adelaide. A multi-storey hospital of 100 beds at Perth was also planned, but later a 200 bed pavilion type was approved instead, by reason of suitability and economy.

At the end of 1940 the following base hospital beds were available in capital cities: Brisbane 200, Sydney 240, Melbourne 240, Adelaide 150, Perth 200, Hobart 200. In civil and repatriation hospitals 340 additional beds were available in Sydney and 395 in Melbourne, and smaller numbers in other cities. In February 1942 these numbers were increased to Brisbane 511, Sydney 1,440, Melbourne 1,350, Adelaide 206, Hobart 310, Perth 530 and Darwin 372. The R.A.N. had 372 beds independently and the R.A.A.F. 1,750. With 4,000 camp hospital beds in Australia a theoretical total of 8,739 beds was available, but a number of these in Concord and Heidelberg were expectations and not actual realities at the stated date. However if we anticipate the bed states attained during 1942 we find the total of 8,739 swelled to 17,217 in June and 21,664 in October.

It was agreed that all Services would use the large base hospitals, but as the navy had other beds available and was in any case little in home waters for the early years of the war, its needs were limited. The Australian Red Cross Society on request provided a number of convalescent homes, and for a considerable period could supply 1,200 beds in these.

With regard to hospital accommodation the 1941-1942 period had two phases, 1941 up to the time of Japan's entry into the war, and 1942 when urgent questions of defence arose. When Australia entered into a state of war with Japan approximately 6,000 beds in base and camp

hospitals were available. Full mobilisation then took place, and the number of troops mobilised in Australia rose from some 120,000 to about 450,000, with in addition 120,000 in the R.A.A.F., and the maximum naval establishment of 36,000. Hospital accommodation was then required on a 4 per cent basis in the base areas, but on a basis of 8 per cent in the more forward areas, which for the purposes of defence included Darwin, North Western Australia, North Queensland and Moresby.

The multi-storey building at Concord was officially handed over on 19th September 1942, with a capacity of 596 beds: by 31st October 782 beds were ready and 587 were filled. The corresponding building at Heidelberg was opened in December 1943. It was of different design to the Concord building which was erected on a restricted site, and therefore on the vertical plan, whereas the Heidelberg Hospital was planned on a more horizontal model. It was fortunate that pavilion hospitals of a good type were erected while the multi-storey buildings were being discussed, planned and erected. Eventually all available accommodation in both sections of these hospitals was welcome.

Greenslopes Base Hospital in Brisbane, as has been previously told, underwent some vicissitudes owing to delays in the selection of a site and in preparing plans, and then was retarded by doubts as to the wisdom of placing a base hospital in the northern coastal district of Australia which might well be a target area. This possibility had important reflections on the whole problem of military hospitals in Australia. Nevertheless, a balanced view was maintained. A suggestion was made early in 1942 that the Prince Henry Hospital at Little Bay, south of Sydney, and situated in an isolated position on the coast, should be evacuated, owing to danger of attack. This hospital in addition to all kinds of general work was the chief infectious diseases hospital of Sydney, and carried out some of this work for the army, but fortunately the suggestion was never regarded seriously. At Daws Road in Adelaide a pavilion hospital of 150 beds was built capable of expanding to 700 beds, though considerable discomfort was experienced in the summer months when overflow was necessary into wards of a temporary type of prefabricated construction. In Perth too a pavilion hospital was built of 200 beds capable of expansion to 400 beds. In Tasmania a new hospital, the 111th A.G.H., was built at Campbelltown between Hobart and Launceston, previously arrangements for accommodation were made in the older part of the Hobart Hospital and in the Launceston Hospital.

Experience showed the great difficulties and indeed absurdities in building a hospital capable of expanding to several times its original size, as the administrative sections and those used for basic and special services could not be enlarged without great trouble. Rapid expansion of base hospitals was of course well nigh impossible except by temporary structures, for which room was not always conveniently to hand, and the central necessary services also needed enlargement. This was to a good extent overcome by establishing or siting hospitals at various strategic points in Australia, which provided beds in centres of military population,

away from the potentially hazardous coastal areas, and also utilised the thoroughly experienced staffs of the A.I.F. general hospitals.

In Queensland a hospital, the 117th A.G.H. was established in Toowoomba, which was a good site away from the coast, but considerable delays occurred before its accommodation could be expanded to 1,200 beds. This was due to difficulties in finding suitable buildings, altering these and constructing additional wards and general service blocks. The Downlands and Glennie Schools were adapted as hospitals, but the experiment of separating medical and surgical divisions in two completely sundered and relatively distant buildings was not encouraging.

A number of other general hospitals were established in Queensland and worked by militia or A.I.F. units as follows: Warwick 600 beds, 2/11th A.G.H.; Redbank near Brisbane 600 beds, 2/4th A.G.H.; Watten Siding 15 miles west of Hughenden in Central Western Queensland, 1,200 beds, 2/2nd A.G.H.; and Charters Towers, 800 beds, 116th A.G.H. Later the Atherton Tableland, on a plateau 2,000 feet above sea level, in the hinterland of Cairns in Northern Queensland, was made an important centre for resting and training troops in a safe and healthy area, with no malarial mosquito vectors. An area capable of taking two divisions called for two general hospitals, and here the 2/2nd and 2/6th A.G.Hs. were stationed.

In the Northern Territory a need for more hospitals was recognised. Two general hospitals were set up there, the 121st A.G.H. at Katherine, and the 119th A.G.H. at Berrimah. In January 1942 the headquarters of the 119th A.G.H. was moved to Berrimah when the work on the hospital there was sufficiently advanced. The previously occupied hospital at Bagot was used for surgical work, as the theatre was not ready at Berrimah, and also for X-ray work, ophthalmic and venereal diseases. There was also a wing of the 119th A.G.H. under Lieut-Colonel Ingram at Adelaide River. Additional wards were kept ready at Bagot for the reception of refugees expected from overseas. Further details will be given later, at this stage February 1942 it will be seen that general hospital accommodation was available in the fortress area at Kahlín Civil Hospital, at Bagot and Berrimah, at the inland wing at Adelaide River and at Katherine.

In New South Wales the base hospital was at Concord, with a maximum of over 2,000 beds, and other general hospitals at Baulkham Hills, 103rd A.G.H., Bathurst, 104th A.G.H., Goulburn, 114th A.G.H., Tamworth, 102nd A.G.H., and temporarily at Armidale, 2/5th A.G.H.

In South Australia two general hospitals were in Adelaide, the base hospital 105th A.G.H. Daws Road, and the 101st at Northfield. In Western Australia the base hospital the 110th A.G.H. was at Hollywood in Perth, the 118th A.G.H. at Northam and the 2/1st A.G.H. in two sections, Guildford and Merredin.

In addition to these general hospitals there were camp hospitals at all points on the mainland where military concentrations were present or where medical attention was necessary in areas of scattered service popula-

tion. These varied greatly in size and equipment. Some were model hospitals on a small scale, capable of expanding in emergency by the use of verandah beds, others were of more modest construction. However the rapid expansion of a number of hospitals in inland sites was greatly assisted by the presence of these camp hospitals, and later when the need for such precautions lessened, the general hospitals were reduced in size without much trouble.

Some of these hospitals had a quiet time, others were very busy, some remained in commission throughout the war, others were closed. Some were developed as special hospitals. Thus at Glennie in Toowoomba an orthopaedic hospital was established; the 114th A.G.H. at Goulburn was planned and run chiefly as a psychiatric hospital, and the 106th at Bonegilla concentrated on tuberculosis. At Tamworth the 102nd A.G.H., a neurosurgical centre was established, but it never proved practical to concentrate large numbers of such cases there, and later this work was done at base hospitals. Facio-maxillary and other varieties of plastic surgery were done in special departments in the large base hospitals. Plastic units were established in Melbourne, Sydney and Brisbane, with a facio-maxillary component in Perth, and at later stages in two others in the islands to the north.

The 2/1st A.G.H. when in Western Australia found the experiment of dividing into two sundered units was unsatisfactory: amongst other difficulties a wastage of officers was felt in administrative posts. The 2/2nd A.G.H. almost literally in the desert at Watten, was committed to a role of modified activity, but a violent cyclonic storm which blew down many of the tented wards and other accommodation, severely damaged huts and then flooded the hospital area, gave an opportunity of demonstrating how a practised unit may cope with an emergency. The hospital was evacuated and left Watten just as "permanent" buildings were nearing completion, and was transferred to Rocky Creek on the Atherton Tableland without any regret.

The accommodation used in these hospitals varied. In some, huts were already in use for wards and administration, in others schools were taken over for hospital purposes. In either instance huts or tents could be used for extending the accommodation, depending on the availability of material. Tents had the obvious advantages of speed of erection and mobility, but their durability was limited, in the northern latitudes particularly their period of useful life was limited, especially when fungus growth invaded them. Special proofing was necessary to ensure tents a reasonable viability in the tropics. Buildings already existing provided immediate shelter, at least in theory, but experience with long used buildings has proved that vast jobs of cleaning and repair await the new tenant. Moreover, buildings like schools need a great amount of adaptation and even then are often unsatisfactory. Personnel accommodation was often as big a problem as the housing of patients and even in base hospitals with all the magnificence of the specially designed quarters for staff, more humble huts were necessary for the increased staff required

to run the units when fully extended. The women's services, while affording great relief in the supply of men for duties as well, or better performed by women, also brought their own difficulties of housing.

DIFFICULTIES IN ESTABLISHING BASE HOSPITALS

Though many problems were encountered in equipping, staffing and organising the large multi-storey hospitals these were not so great as those confronting the pioneers who started the original pavilion hospitals. These were known as general hospitals at first, and for a considerable time, until the official term military hospital, embodying the location name was introduced. The term base hospital is convenient, and borrowed from civil practice, but actually most hospitals were known by their place names, e.g. Greenslopes, Concord, Heidelberg, Campbelltown, Daws Road and Hollywood. The position in the Northern Territory was so confused that no true base hospital was recognised there. In Sydney, when the site of part of the old "Yaralla" Estate was acquired for a military hospital the name "Yaralla" was used for a time, but the name officially adopted was "Concord".

Some of the trials of the original commanders and their staffs of Concord and Heidelberg may with some advantage be recalled. These hospitals passed through their most difficult phase while measures were being taken for the defence of Australia, when the possibility of attack from without was still live, and when the separation of the two parts of the Australian Army was emphasised by the return of two divisions of the A.I.F. The enthusiasm and loyalty of the staffs which organised these hospitals was beyond question; many of the men had some physical handicap and were "B" class, and a number of them veterans of the 1914-1918 war. Establishments were drawn up after consultations between the commanders, registrars and quartermasters of Concord and Heidelberg, but the difficulty was to obtain approval of these suggestions. Perhaps the retention of the term "A.G.H." was a tactical mistake, for the conditions of an A.G.H. in the field, often perforce submitting to temporary arrangements, are vastly different from those of a base hospital in a capital city. This difference seemed to be difficult of realisation by the senior officials of the ordnance department; the fact was that the equipment of a field hospital was completely inadequate and unsuitable for a base hospital. Beds had no foot elevator to allow free movement, over-bed tables were flimsy and too low to pass over the bed, and the wooden bed lockers were fragile and unpractical. Eventually a satisfactory scale was adopted and gradually, with the help of equipment officers from the N.S.W. Hospitals Commission and an equipment specialist generously loaned by Stephenson and Turner, architects, suitable equipment was designed and obtained. Similar difficulties were encountered with staff. The dispersal of the pavilion wards was wasteful of staff. It was computed that it took a man twelve minutes to push a food trolley from the kitchen to the farthest wards of one hospital. Self-help was found the most fruitful method of acquiring staff, and various semi-

official or unofficial methods were used; advertising in the daily Press produced quite a number of men who were not always fully physically fit, but gave valuable help.

Specialists such as physiotherapists, biochemists *et cetera* were not provided for at first, and the general conditions of enlistment of specialist members of staff were unsatisfactory. When, as will be told later, women with high attainments were brought under the general control of women's services, without regard for special qualifications, the base hospitals felt keenly the difficulties so caused. Medical staff was scarce in the early days too; in Heidelberg local practitioners were pressed into service in a part-time capacity, and it was necessary also to use medical officers from neighbouring camps.

Medical boarding was on an unsatisfactory basis at first, and the same difficulties were felt as in the general hospitals. Visiting medical boards of review were assigned for part-time duty to the base hospitals, but as the members of boards could only visit the hospital at stated intervals, and often could average only seven or eight boards per visit, the work could not be overtaken. Later, different arrangements were made. It must of course be realised that the great expansion of medical services intensified all these troubles. When the medical headquarters was also expanded to meet these growing needs the increased staff dealing with hospital accommodation, staff and treatment did much to ease the way for these big hospitals. It is no light matter to spend millions of money in erecting huge modern hospitals and establish them as efficiently running concerns during a period of great military development and national need. Various patriotic bodies also gave generous assistance in the form of voluntary service, gifts of equipment, amenities and entertainment. Sporting bodies, various societies organised groups in businesses and factories, local councils, returned service men's organisations, the Comforts Fund, and of course the Red Cross Society and the Order of St. John gave help that often made the work possible.

Some criticisms were made of the buildings themselves when the pavilion hospitals came into use. No provision was made for taking large numbers of patients in convoys, though this was the common routine. The problems raised by dispersion have been mentioned: their solution lay in the provision of staff and special equipment.

When the 6th and 7th Divisions returned to Australia a number of entire A.I.F. medical units were employed in areas in which they were needed for the medical side of Australian defence. In some instances full-time militia officers were introduced into A.I.F. units; in others A.I.F. medical officers were posted to militia units. The same principle of using the most apt men for particular tasks was applied in the administrative sphere. There was, however, no dispersal of the A.I.F. medical units, and these retained their integrity. The general hospitals carried out their work much as they had overseas, but in a very different environment, and at a temporarily lowered intensity. In the main and for some time the base units were allowed to follow the lines already laid down.

RELATIONS OF THE A.I.F. AND THE MILITIA

Early in 1942 there were some differences of outlook between the branches of the medical and nursing services of the A.I.F. and the A.M.F. in Australia. That these should exist is readily understood. The A.I.F. overseas had built up an organisation which had proved its capacity to deal with medical problems of all sorts, in the field, in advance, in retreat, in lines of communication and in base areas. To these tasks the force had brought a profusion of medical talent, which could have been equalled by the profession at home, but which was singularly fortunate in its even quality. A self-contained force had been evolved, and each component of this had also evolved its own methods, adapted to the tasks in hand. Its members worked in a degree of isolation from affairs on the home front which sometimes increased difficulties many fold, they sometimes faced danger and had suffered losses. The members of the A.M.F. often performed part-time service under conditions of considerable strain, and those who were on full-time work were either carrying out routine duties, necessary, but often monotonous, or were discharging responsibilities of professional administrative or organisational kind which were equally important and often as worrying as those falling to the lot of colleagues overseas. It is unquestioned that there was no difficulty in picking out numbers of returned officers who could amply fulfil duties for which it had been impossible to spare a militia officer adequate for the task, and the infusion of the A.I.F. into the medical units engaged in Australia undoubtedly produced more efficient working. It would have been strange if this had not been so. However, it was inevitable that the fusion of these forces could not be accomplished without some difficulty. In individual instances it was only a question of personality: many will recall units where no trace of difficulty was ever felt, but perhaps in both there was a trace of superiority discernible, and a trace of resentment when criticisms were implied. Of course a common need and the inextinguishable fraternity of a profession strengthened the bonds of service, in spite of the unfortunate sundering of purpose between the two divisions of the Australian Army. Even the expedient of allowing units to "become A.I.F." if a sufficient percentage had transferred from the militia to the A.I.F. had little more influence in medical circles than any other political expedient.

A couple of small matters may be mentioned in illustration of the lack of psychological insight inherent in some official decisions. Returning officers from oversea service, once they had been severed from their units and from the A.I.F., were sometimes permitted, if fit, to resume service at home, but they were not allowed to remain in the A.I.F. Some of these were of senior rank and status, and were brought back to Australia to perform certain specialised services. They usually welcomed opportunities to rejoin the A.I.F. by later transfer, but in the meantime it would be idle to deny that there were heartburnings and resentment. Similarly nurses volunteered for the A.I.F., and were accepted, but were not technically admitted to the A.I.F. with a coveted "X" number unless and

until they were placed as members or reinforcements of oversea units of the A.I.F. The situation arose when nurses were needed for the Northern Territory, and no doubt with the best intentions nurses at a base hospital were asked if they would volunteer for service there. A number took the stand that they had already volunteered for service anywhere and that further volunteering was superfluous.

These instances show the problems which arise with special forces. In the case of base hospitals there is some reason to believe that the appointment of full-time officers in charge of medical and surgical divisions of the base hospitals was delayed longer than might have been because of some difficulties in aligning the views of hospital administrators and staffs in Australia with the views and experience of the A.I.F. hospitals overseas.

CONVALESCENT DEPOTS AND HOMES

Convalescent depots and convalescent homes were also needed in greater numbers as hospitals grew. About 32,000 hospital beds were needed in Australia when the risk of Japanese attack appeared to be at its height in 1942; a saving of "acute" beds could be effected by sending men to less elaborate units for convalescence, but this was somewhat offset by the greater number eventually requiring a period of rest before being returned to their units. A certain difficulty appeared in some of the larger cities and towns. The need for convalescent depots was great in the early years, yet they did not have a high priority compared with that of field and hospital units. This led to the adoption of the expedient course of using sites like showgrounds, which were usually not suitable for the purpose and had the added drawback of being near the temptations of towns. A further result was that there was a greater call on convalescent homes, for which the Red Cross Society was responsible. These homes were intended for men who needed some degree of comfort and personal, rather than medical care, and no organised methods were adopted, other than diversional therapy, to harden the men and return them as early as possible to their units. For the latter purpose the convalescent depot is adapted, by reason of its selected staff and its military atmosphere. Women service patients were more appropriately treated in Red Cross homes during convalescence, and the three medical services combined in providing medical supervision and nursing care and guidance. The Red Cross Society responded with enthusiasm to the increasing need for convalescent homes and for services in medical units, and supplied transport facilities on a large scale.

CHANGES IN ORGANISATION AND ADMINISTRATION

One of the most outstanding changes which followed the return of the A.I.F. to Australia was in the central administration of the army. General Blamey was appointed as Commander-in-Chief of the Australian Military Forces, and the defence organisation adopted on his recommendation included two armies, the First and Second Australian Armies. Each of these required a Director of Medical Services, and a Director-General of

the Medical Services was also appointed at the General Headquarters in Australia.

On 8th May 1942 the following senior A.A.M.C. appointments were made:

Major-General Burston, D.M.S. of the A.I.F. Middle East, became Director-General of Medical Services, at the General Headquarters (Australia); Major-General Maguire, who had been D.G.M.S. was offered, and accepted a position as D.M.S. of the First Australian Army, but owing to ill health was placed on the retired list on 14th April 1942. Brigadier R. W. W. Walsh was appointed D.M.S. First Australian Army with temporary rank of major-general, and Major-General Downes D.M.S. of the Second Australian Army.

Brigadier Johnston was appointed D.D.M.S. I Australian Corps, and Colonel Disher, who had been recalled from Australia to be A.D.M.S. of the 1st Australian Armoured Division, was appointed D.D.M.S. of the II Australian Corps with temporary rank of brigadier; Colonel D. W. McWhae D.D.M.S. of Western Command was appointed as D.D.M.S. of III Australian Corps, with temporary rank of brigadier; Lieut-Colonel MacCallum was appointed as Deputy Director-General of Medical Services at General Headquarters, with temporary rank as colonel.

At this time Colonel Fairley recommended to the D.G.M.S. the appointment of full-time regional consultant physicians to cover the areas of Victoria and Tasmania, New South Wales and Queensland. South Australia and lines of communication and Western Australia should be covered by part-time appointments. This he considered necessary on account of the great areas involved and the varied problems presented. The D.G.M.S. agreed that immediate appointment should be made for the Victorian and New South Wales areas, and recommended that Colonel H. H. Turnbull and Colonel A. S. Walker be appointed. These appointments were ratified after several months delay, during which these officers carried out their duties on an unofficial basis. The principle of regional consultants was not fully accepted at that time, but in the later stages of the war the ever widening distances made it imperative in certain sectors.

THE EFFECTS IN AUSTRALIA OF THE JAPANESE WAR

The effect on the size and the functions of the armed Services, in particular of the army, following the threat of attack from Japan is too wide a subject to be dealt with here, and is partly political. We are, however concerned with this great expansion as it affected medical services. The early months after a state of war appeared imminent with Japan fell into two phases, that of the threat, and that of the actuality of war. The danger was early realised in Australia, and defence forces were placed accordingly. Some of these were token forces only. Others were of reasonable size, but not really equipped in the event of serious attack.

The Northern Territory Force was a formation which expanded from the troops based on Darwin on the outbreak of war. From the beginning medical administrators had a difficult task there. To combat the inertia which permitted poor hygiene and imperfect control of medical conditions needed strong personalities and adequate support. Had it been possible to build a good military hospital and to staff it adequately in the early period of the war things would have been better, but approval could not be obtained. The accommodation at length obtained at Bagot Compound was poor, and temporary only. A detachment of the 2/5th A.G.H. under Captain Brooke Moore arrived in Darwin in July 1940 and remained there till the end of the year, when they were able to help with an outbreak which was thought to be of meningitis, but was apparently in the main due to dengue fever. The Bagot Compound was opened on 9th December with Major N. W. Markwell as senior medical officer, and Captain W. T. J. Harris in charge of the hospital. Major W. Russell was D.D.M.S. of the 7th Military District and Dr W. B. Kirkland, chief medical officer. The hospital was known as the 19th A.G.H., but in April 1941, as 119th A.G.H. it was sent to Katherine, with Colonel E. Culpin as commander. The 2/12th Field Ambulance under Lieut-Colonel N. D. Barton settled near Darwin and supplied detachments which undertook the medical care of troops of the 23rd Brigade A.I.F. sent to Timor and Ambon. Lieut-Colonel Ingram was sent from the 119th A.G.H. to Adelaide River to organise a wing of this unit for emergency purposes. The medical services thus were expanding in 1941, but the position was not satisfactory. Occasionally severely ill patients were sent south by air, and others by ship, but most of those with medical disabilities were transferred from the 119th A.G.H. to Bagot and thence to Berrimah. Surgical cases were kept at Bagot, where the conditions were uncomfortable. At the end of 1941 the 300 bed hospital authorised at Berrimah was incomplete but was partly occupied when the open break with Japan came.

During January there was an increasing possibility of numbers of sick or wounded arriving as refugees from the Japanese invasion and some preparations were made. The fitness of the troops was not satisfactory; of 119 men who arrived in April 1941 by sea 42 had been transferred back by January 1942, chiefly on medical grounds. There was a widely held belief that the area was an exhausting part of the tropics, and that the isolation and endemic diseases begot a neurosis peculiar to the place. Early in 1942 there was an impending feeling over most of the Australian mainland, the Northern Territory was naturally no exception. To the north and the west the Japanese had overrun Malaya and the N.E.I., farther east all the slender defence forces insulating Australia from the Japanese were dissipated excepting the as yet untouched force in Moresby. On 15th February Singapore fell. Four days afterwards Darwin was attacked from the air.

THE AIR RAID ON DARWIN

The 2/1st Australian Hospital Ship *Manunda* arrived at Darwin on 14th January 1942. Instructions were received to reduce the intensity of lighting during the dark hours, but as this was difficult to carry out, a complete black-out was rigidly enforced by the Master. Merchant ships were also blacked-out, and the American naval units, but the Australian naval ships remained lit. As the work of the port had to go on, in view of its urgency, the limited wharf space available and the extremely slow rate of the work by the civilian labour at hand, the wharf was also lit at night. A danger commented on by the ship's officers on the *Manunda* was the existence of only one oil and one water line, which ran under the wharf without any lines moored to floats, or otherwise, and thus limited the facilities for fuelling and watering ships. Some cargo was shifted by lighters, but this was very slow. The crew and military staff of the *Manunda* were unoccupied except for routine duties. On 18th February a convoy of ships carrying troops which had left the harbour some days earlier returned after having been turned back by an air attack at sea. The ships were unable to reach their destination though their escort ensured a safe return with some casualties on board. The Japanese at least had knowledge of military movements.

On the morning of 19th February at 1005 hours a bomb fell near the wharf. Observers on the *Manunda* agreed that this was the first warning: it was immediately followed by the air raid sirens on shore. The bomb was the first of a series from a Japanese formation which flew over and returned to the attack regardless of anti-aircraft fire. Within ten minutes the wharf was burning, two ships at the wharf had been hit and one was on fire. Ships in the harbour were also hit, some were on fire, others damaged and one sinking. A Catalina flying boat was in flames, and two American destroyers were blazing; one bomb narrowly missed the *Manunda*. The hospital ship crew manned the motor life-boat and picked up over thirty badly wounded and burnt men. Other boats picked up more a little later: they too were taken to the *Manunda*. On the second perfectly coordinated run the enemy planes hit the *Neptuna* which later blew up, fired the *Zealandia* and sank the oiler *British Motorist*. Dive-bombers then arrived while boats were putting off to pick up more survivors. In this attack the *Manunda* suffered a near miss which killed four on board and inflicted severe damage on the plating and upper works. Another bomb struck the ship and just missed the bridge but did immense damage to the navigation instruments, and the forward parts of the music room and "B" and "C" decks. A few fires were started on the ship: one was troublesome. One aid post was hit, another was set on fire but continued working. Great damage was inflicted on the parts of the ship receiving the direct hit. The quarters of the medical officers and nurses were destroyed. Worst of all, twelve were killed, one officer, one nurse, and one corporal and two officers and seven ratings of the crew. Eighteen were wounded and forty more received slight wounds and remained on duty. Nineteen bodies were taken ashore for burial the next day, and

fifteen more were later buried at sea. Many of the patients suffered severe burns, and the shortage of tannic acid and triple dye was felt. A supply of plasma or serum would have been very helpful. Though an alarm was sounded later in the day the commanding officer, Lieut-Colonel Donaldson and his medical staff were able to work on without hindrance other than that imposed by the circumstances. The engineer staff managed to restore the essential services to the hospital sections of the ship and all of the staff worked tirelessly. Surgical work continued till after midnight. Difficulty was found in carrying the patients up and down stairways, as the lift for cots was out of action, but canvas emergency stretchers which had been provided were found most useful. A question which has raised some discussion in connection with the Darwin raid centres round the Geneva Convention. It will be recalled that, although the *Manunda* was anchored about a mile from the wharf, the ship was in the centre of a group including the *Peary* and the *William B. Preston*, the *Zealandia* and the *British Motorist*. The damage was inflicted by one or two dive-bombers only, the remainder left the hospital ship alone. Donaldson suggested that the pilots may have lost their heads during the excitement; had the Japanese wished to destroy the ship surely they would have done so, as the bombing was extremely accurate. This was the case also in the town area, but it is harder to explain the machine-gunning of Berrimah Hospital, shortly to be described, as other than deliberate. In the harbour however, it must be admitted that the *Manunda's* anchorage was not well chosen for safety.

The next afternoon patients began to come in from the shore, and 190 were embarked on this day. Survey of the ship showed that though badly damaged, the *Manunda* was seaworthy; accordingly she sailed at 11.30 p.m. on 20th February, bound for Fremantle. An injured naval reserve officer was able to help with the difficult task of navigation; the Third Officer had been killed, and the Second Officer wounded, and the Fourth Officer was wounded, though remaining on duty.

A summary of the losses in the harbour showed that eight vessels, including the American destroyer *Peary*, and three flying boats were lost; eleven ships, including the U.S.S. *William B. Preston*, H.M.A.S. *Swan* and H.M.A.S. *Platypus* were damaged. The *Manunda* arrived at Fremantle on 27th February, and temporarily disembarked patients from some of the wards while repairs were undertaken. It was found that the damage was too extensive for full immediate repair, and after embarking these patients and a number of others already in hospital on shore, thereby relieving the local bed space, the *Manunda* continued her voyage to Adelaide. There all the patients were disembarked and the medical staff of the hospital ship were marched into the 105th Military Hospital in Adelaide.

We must now return to Darwin and consider the medical aspects of the raid from the point of view of those on shore. The warning given by the return of a military convoy of ships to Darwin Harbour was even more forcibly repeated by the arrival on 18th February of eleven casual-

ties from the air attack on this convoy. The next day Berrimah Hospital was attacked by an enemy formation from the air, and four wards were machine-gunned from low level. Most of the staff and patients dispersed in the bush; one patient, too ill to move far, was fatally wounded while sheltering under a bed. A nurse showed bravery in sheltering another patient with her person during this attack. The less ill patients were moved out of hospital to make room for casualties. The civil hospital was also attacked and damaged, and about sixty patients and staff were transferred to Berrimah. Surgical teams under Majors Mack and Coles worked all night. By next day five patients had died in hospital: a number of others were sent to Adelaide River, and some sixty patients, mostly on stretchers were transferred to the *Manunda*; Major Arnott and three nurses accompanied them.

Summing up the events of the 19th February, whatever may be said of the lack of reality in the organisation existing there at that time, the medical side of the emergency was well handled on sea and land. On the hospital ship in particular the value of practising the staff in manoeuvres necessary in emergency was evident. From the view point of medical observers it cannot be said that the general morale of Darwin was as high as it might have been. The distant effects of the raid were perhaps good in the end, but it is open to question if the withholding of the true position in official statements made later was wise even from the psychological point of view.

On 24th February Lieut-Colonel Pomroy was appointed S.M.O. of the fortress area; examination by Culpin and Pomroy showed that the Kahlin Hospital had been badly damaged and in addition had been looted. Bagot wing was practically emptied of patients, and arrangements were made for preparing the hospital in the fortress area for further work. Work was also proceeding on the site at Adelaide River. It was decided to evacuate Berrimah. Looking back on the medical affairs of Darwin there can be no doubt that the reiterated complaints of the medical directorate at headquarters were justified. It was always difficult to get things done at Darwin, which did not readily catch the eye of the finance authorities. Moreover, in the Northern Territory at this time it seemed difficult for the various service and civilian interests concerned to be fully reconciled to a common effort. In November 1941 Culpin complained that the shortage of staff was hampering work at the 119th A.G.H., and that this was exaggerated by the discontent of the troops in the area because their service in the 7th Military District did not entitle them to A.I.F. status. Further, relations between the A.D.M.S. and the senior medical officers of the area were often not satisfactory, even after the air raid.

Later events in the area may now be briefly mentioned. In April 1942 Major-General Herring, who had just arrived in Australia in command of the 6th Division A.I.F. was sent to take command of the Northern Territory Force. The components of the force were then a militia brigade, plus the 23rd Brigade A.I.F. less its three battalions, which had been sent to Rabaul, Ambon and Timor. The A.I.F. troops in this brigade

were then the 2/4th Pioneer Battalion, the 2/14th Field Artillery, and such part of the 2/12th Field Ambulance as had not gone to Ambon or Timor. The 17th Field Ambulance under Lieut-Colonel R. G. Worcester had then also arrived in Darwin. A full-sized hospital of 600 beds was built at Katherine, and Colonel A. W. Morrow arrived in May to take command, with Lieut-Colonels J. M. Buchanan and J. P. Horan controlling the surgical and medical divisions. At Adelaide River Colonel J. R. Donaldson commanded the 119th A.G.H. with Lieut-Colonels C. A. M. Renou and J. H. Halliday in charge of the surgical and medical divisions. In both hospitals the appointment to the staffs of relatively senior officers with oversea experience was felt to be advantageous.

In August 1942 the number of men in the three Services in the Northern Territory was R.A.N. 1,875, Army 27,000, R.A.A.F. 9,000, a total of 37,875. These numbers called for the services of large hospitals, and in addition to those mentioned there were field ambulances, and camp hospitals necessary where considerable distances intervened, and the R.A.A.F. also had their own service.

PRISONERS AND INTERNEES

Increasing numbers of persons, civilians and members of services were held in internment camps throughout Australia. Some of these were suspects interned for motives of security, the majority were prisoners of war. Many Italian prisoners were brought to Australia, and a number of Germans also. The medical problems in these camps were not complicated nor did they on the whole give rise to much trouble or anxiety.

In January 1942 the Military Board laid down the arrangements made in respect of prisoners of war and internees shipped to Australia. The usual precautions were taken on transports and in ports of arrival, and if necessary quarantine was instituted. As far as possible prisoners from the Middle East where dysenteric diseases were endemic, were disembarked at Sydney and sent to Cowra, a sewerage camp, for observation. Suspected infections or carrier states were investigated in a special compound. In Volume I in the section on amoebiasis the measures taken to combat the risk of spreading this disease are described. Observations showed that after a period of care and observation, and treatment of frank infections, there was no evidence of risk having been imposed on the civil community. No prisoners were employed on projects outside their camps for six months after arrival. Rigid hygiene arrangements were laid down for all these camps and these were strictly supervised. Medical officers regularly attended all the compounds and regular inspections were carried out by senior medical officers. Arrangements were made for protected personnel in special camps. Occasional problems arose when alien medical officers prescribed proprietary or exotic compounds for fellow officers in these camps, as such substances were often extremely scarce and sometimes unobtainable. However, the principle was respected that, provided no hardship was inflicted on the general public, facilities were given for the medical officers to obtain material they desired, if it was considered

essential by the army medical services, and supply was not unduly restricted.

Japanese internees were carefully examined. One group of 228 was examined for parasitic infestation, and 3.1 per cent were found to harbour *E. histolytica*, 15.8 per cent *Anchylostoma*, and 13.6 per cent *Ascaris*. Experience showed that careful hygiene was sufficient, as subsequent tests showed that the number of carriers lessened considerably without specific treatment.

Indonesian internees needed special supervision also. Malaria was a most important disease in this respect, and to reduce carrier risk men, women and children evacuated from malarious areas were carefully examined. In the Northern Territory particularly, every care was taken to treat any infection discovered so as to avoid the real risk of introducing any of the types of malaria into Australia. In general no serious medical position arose with prisoners and internees: their nutrition and general medical condition remained satisfactory.

In May 1942 the National Health and Medical Research Council specially considered the measures necessary for the safeguarding of Australia from the introduction and spread of disease in this way. A special report was presented by Colonel M. J. Holmes, Director of Hygiene at the General Headquarters. The Council found that the results of supervision, investigation, and where circumstances warranted and permitted, treatment, dealt satisfactorily with the problems.

Early in 1942 the presence of prisoners of war in Australia made necessary the appointment of a medical commission to examine prisoners under the terms of the international conventions, to ascertain if any of them should be repatriated on medical grounds. A truly international "mixed medical commission" was not available, but the following were appointed and approved for the purpose, Lieut-Colonels S. O. Cowen and Walker and Hon. Colonel P. Fiaschi. The personnel of this commission was later varied as some of the original members became unavailable. The internment camps were visited in turn, all prisoners of war who desired to appear before the commission were examined and reports made on their physical condition, and as is prescribed in the convention concerned, special attention was paid to psychological states which might suffer deterioration by reason of captivity. In general the health of prisoners and internees was found to be satisfactory.

LIAISON WITH ALLIES

The outbreak of war with Japan meant the basing of military preparations on the mainland of Australia, especially the coastal areas, and the seas to the east, north and the west. This meant close liaison with Allies, especially the Americans and to a less extent the Dutch. At the end of April 1942 the United States forces in Australia numbered 58,526. Some months before this it was reckoned that the arrival of U.S.A., forces in Australia involved arrangements for 40,000 naval personnel in all ports, and 67,000 army. The American medical arrangements were then six

general hospitals of 1,200 beds, three of 600, three C.C.Ss. and three convalescent depots, ten field ambulances, one mobile bacteriological laboratory, sixty dental units and three hospital ships. Some of the requirements could be met with existing units. In the capital cities excellently staffed and equipped American units were able to take over, by special arrangement, sections of hospitals, in one instance, the new nearly complete Melbourne Hospital. The United States Government was asked to send forward all army units with full medical establishments and to supply equipment and stores for twelve months. The most friendly professional relationships were established between American and Australian physicians and surgeons. American medical officers were attached for duty to Australian units, such as hospitals and hospital ships, with mutual benefit. Extensive constructional programmes were begun. As the events of 1942 shaped themselves it could be seen that the centre of gravity of joint efforts was moving farther north, and although base institutions continued to be necessary in the southern parts of Australia, the greatest activities were seen in Queensland, and in growing areas of New Guinea under Allied control. Liaison with the Dutch medical services was needed more closely in 1942 and the early periods following, when Australia received numbers of Dutch civilians and servicemen who had been forced south by the extending thrust of the Japanese. Later forces were organised in Australia with the purpose of training for overseas fighting, and in these and other activities the Australian medical headquarters gave what assistance was possible.

CONCLUSION

At the end of 1942 the last battle of the A.I.F. in the Middle East had been fought, and the 9th Division and base troops, following the successful rout of the German forces at El Alamein embarked in the "Liddington" movement and returned to Australia. This brought back two general hospitals, a C.C.S., three field ambulances, a convalescent depot and a field hygiene section, all highly experienced in action conditions. The Services were now faced with the deployment of much larger forces over a much greater area, in difficult terrain, and with medical problems of serious nature. Meanwhile nearly a year had passed since another force, the 8th Division A.I.F. and some components of the 7th Division had, after a brave fruitless struggle disappeared into the oblivion of captivity. We must follow the trials and hardships of this division, and describe the story of the medical corps, whose opportunity for service was even greater under the cloud of defeat than in the flush of victory.

PART II

CHAPTER 21

I AUSTRALIAN CORPS RETURNS

TOWARDS the end of 1941 it was evident that the war was threatening to spread to other zones of vital importance to Australia. Defensive forces of Australian troops had been sent to Malaya, Darwin, Thursday Island, New Britain, Ocean Island, Nauru, New Caledonia, Timor and Ambon. A medical officer with orderlies was in Kavieng and a medical orderly in Tulagi and in Vila.

Overseas, in the Middle East, the position was rather less pressing, for Germany was heavily committed in Russia, and following the opening of a British offensive in Libya, British forces had at last relieved the defenders of Tobruk on 26th November. But, as has been pointed out in previous chapters, future threats in the Middle East were certain to be made in North Africa, where Rommel would try to sweep through to the Suez Canal, and possibly also in Syria, where there was danger of a German thrust through Turkey.

In the Far East, however, Japan's surprise attack fell on 7th December 1941 on Pearl Harbour, other strategic points in Malaya and elsewhere, and a declaration of war was followed by a series of well planned and executed landings of forces along a line stretching from Malaya to Rabaul. From the first it was evident that the entry of Japan into the war meant danger from the Far East, but the extent of the danger was not so easily foreseen until the speed and success of the Japanese military operations left a broad swathe of loss and ruin in their train.

Britain and Australia agreed that Australian forces should be diverted to resist Japanese aggression, and thus the Middle East phase was closing for most of the A.I.F. As we know, the 9th Division was reserved for further service in the desert, and the I Australian Corps, less this division and some base troops, was embarked from several ports in the Middle East in the movement known as "Stepsister".

MOVEMENT "STEPSISTER"

This movement began on 30th January 1942, and from that date onwards convoys carried the Australian corps in three flights. The field ambulances of the 9th Division, the 2/3rd, 2/8th, 2/11th, and the 2/4th Field Hygiene Section remained behind, together with the 2/3rd C.C.S. and the two general hospitals, the 2/6th and 2/7th. All the other Australian medical units participated in move "Stepsister".

The movement as seen from the viewpoint of these medical units had some element of mystery; it was generally known that the corps was bound for the Far East, but that was all. Some 60,000 troops and their equipment were involved and for this purpose an imposing number of ships were assembled, including large ships such as the *Mauretania* and other well known liners. Early in January warnings of movement were

given to some units, and rapid packing was necessary. Units allotted to the first flight were the 2/6th Field Ambulance, 2/2nd Field Hygiene Section, 2/4th Advanced Depot of Medical Stores, 1st Mobile Operating Unit and 1st Anti-malarial Unit, the 2/2nd C.C.S., 2/5th and 2/11th A.G.Hs., and the 8th Australian Special Hospital. In the second flight were the 2/4th, 2/5th, 2/7th Field Ambulances, 2/1st Field Hygiene Section, 2nd Anti-malarial Unit, the 2/1st C.C.S., the 2/2nd and 2/9th A.G.Hs., the 14th Australian Special Hospital, and the 2/1st Base Depot Medical Stores. In the third flight were the 2/1st, 2/2nd and 2/13th Field Ambulances, 2/3rd Field Hygiene Section, the 2/1st and 2/4th A.G.Hs. and the 2/3rd Convalescent Depot.

One interesting medical feature of this move was that a fully equipped advanced depot of medical stores left on the first flight, and the base depot followed in the next flight. It was evident that previous emphatic requests for reserves of medical stores had produced a satisfactory result. The second flight was completed in the third week of February, but all the medical units scheduled to move with "Stepsister 3B" in the third flight were notified that the movement was postponed, though a week later again sailings were resumed. Beneath the smooth fulfilment of "Movement Stepsister" and only dimly realised by the participants were confused currents of high policy and rapidly changing military strategy.

The original intention of General Wavell, Supreme Commander of the ABDA (American, British, Dutch, Australian) area was to use the Australian corps in the reinforcement of Malaya, but by the time the first flight was ready to leave Suez it was obvious that the Japanese were driving the British troops back into Singapore and that the help would come too late. Therefore Wavell proposed to use the first division of Australians to arrive for the defence of an important group of aerodromes in southern Sumatra, and the following division to reinforce the garrison of Java.

A number of senior administrative and executive officers travelled from the Middle East to Batavia by air, and amongst them were the D.M.S., A.I.F., General Burston, Colonel Fairley, Consulting Physician and Lieut-Colonel MacCallum, A.D.M.S., H.Q., A.I.F. The detachment from the medical headquarters was concerned initially in making a survey of Java from the medical point of view. The intention was to carry out preliminary staff work for the provision of medical services in Java, selection of sites for medical units and the establishment of lines of evacuation, and the making of reciprocal arrangements with the Dutch authorities.

A.I.F. IN NETHERLANDS EAST INDIES

The convoy in the first "Stepsister" flight left Bombay for the Far East on 13th February, and early the same day a Japanese convoy of ships moved from the Anambas Islands towards southern Sumatra. The next morning the Japanese made a paratroop landing at Palembang, an important river port with large oil refineries.

On 15th February the *Orcades*, travelling ahead of the A.I.F. convoy arrived under escort at Oosthaven in the south-west of Sumatra, and arrangements were made to disembark some 2,000 troops. With these troops were two medical officers and thirty other ranks from the 2/2nd Australian C.C.S. who were to set up a camp dressing station. But before anything further could be done an order was received for the troops to be re-embarked and proceed to Batavia. This order was fulfilled on the following morning, but in the meantime news had been received that Singapore had fallen on 15th February. While efforts were being made to strengthen southern Sumatra, recognised by Wavell to be "the last outpost of Java to the west", the Japanese captured Palembang airfield, and landing forces of at least a division were making their way from Banka Straits up the River Musi. On 16th February Palembang was taken by the Japanese, all hope of holding southern Sumatra had vanished, and the evacuation of the island was inevitable. (It was now apparent that hope of strengthening the defence of Timor could not be realised, and reinforcements sent from Darwin were turned back on the same day. The return of this convoy to Darwin has been mentioned previously in Chapter 20.) A mission was sent from the A.I.F. corps headquarters in Java to participate in the evacuation of Sumatra: this included Brigadier C. S. Steele, Brigadier V. C. Secombe, Major I. Webster and Lieut-Colonel W. P. MacCallum.

Following the paratroop landing the utmost confusion prevailed on the 300 mile road to Oosthaven. It was only a narrow jungle road at best, and unfit for heavy vehicles. The chance of organising resistance or even of covering a retreat was slender, but the A.I.F. party organised an efficient withdrawal, which saved some valuable material, and enabled many civilians to escape; all manner of vessels ferried them across the Sunda Straits to Java. When the A.I.F. mission returned from Sumatra to Batavia the *Orcades* was at the chief port of Tanjong Priok, with the troops on board, having arrived on 17th February. A Japanese attack on Java was now imminent, and on 18th February Wavell regarded its successful defence as very doubtful, and recommended the diversion of the Australian corps to Burma.

On the 19th the Australian troops disembarked from the *Orcades* and the 2/2nd C.C.S. was despatched by train to Bandoeng in the hills inland from Batavia, where it was planned to set up a hospital. On the morning of the same day the Japanese attacked and seized the aerodrome on Bali, and bombed Darwin. They had also attacked Finschhafen on the north coast of Papua. The staff officers were then engaged in hurried preparations for "Black" Force, a formation which was hastily assembled as a nucleus of defence in Java under Lieut-Colonel A. S. Blackburn. Lieut-Colonel N. Eadie, commander of the 2/2nd C.C.S. was appointed as senior medical officer to the force, and the command of the C.C.S. passed to Lieut-Colonel E. E. Dunlop.

At Tanjong Priok the A.I.F. medical officers again met a scene of extreme confusion surrounding the collection and storing of medical supplies. MacCallum remarked that:

No one really knew what there was or where it was. In the stores everything was so indiscriminately packed that vehicles were literally covered by every variety of medical supply and only found by chance beneath piles of cooking utensils, auto-claves, Red Cross comforts, bales of blankets, stretchers, *et cetera*, all pitched together in a heterogeneous mass.

There was also lack of coordination in the movement from Suez with regard to supplies, evidenced by the delay in producing equipment belonging to a medical unit. The *Orcades*, for example, was also carrying the baggage of the 2/5th A.G.H., though not the members of the unit. However, with the help of Lieut-Colonel Marsh, liaison officer to the British headquarters, General Burston, and Lieut-Colonel MacCallum, some R.A.M.C. supplies were obtained belonging to a British unit which had become separated from the rest and diverted elsewhere, and these were sent to Bandoeng. The nurses came to Bandoeng with the C.C.S., but in view of the rapidly deteriorating position in Java they were returned to Batavia, re-embarked on the *Orcades* on 21st February and sent to Australia.

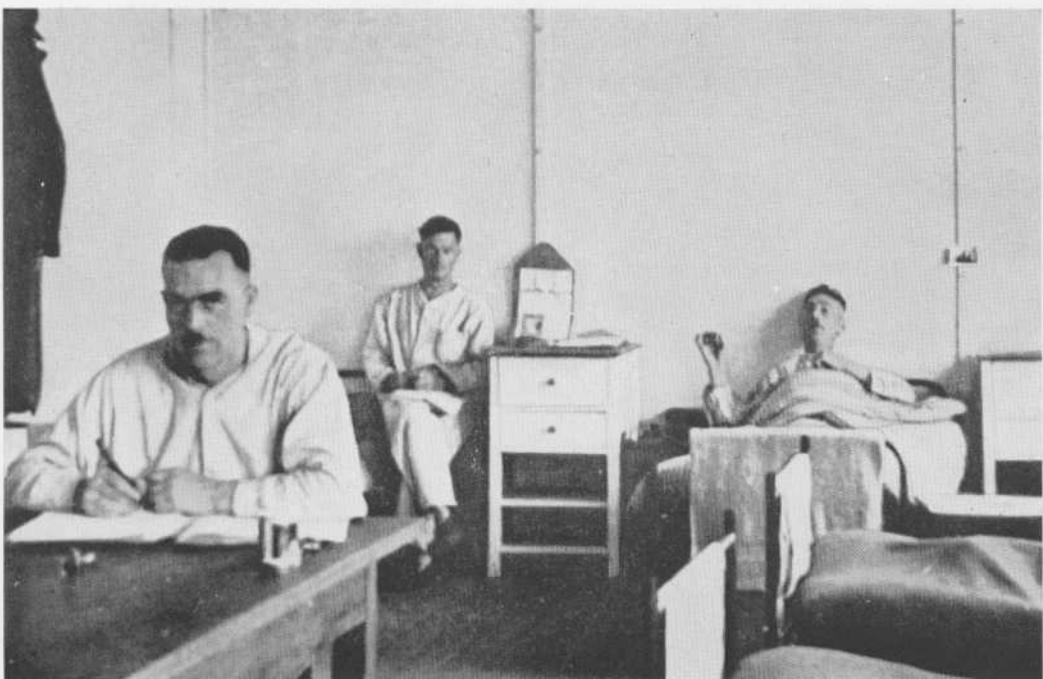
ALTERED PLANS FOR THE A.I.F.

Meanwhile the remaining ships of the first two flights of the "Stepsister" movement, were at sea, and the destiny of the A.I.F. 6th and 7th Divisions was in doubt. It was evident that the plan of using the A.I.F. in the Netherlands East Indies had been frustrated by the rapid movements of the Japanese. At that stage this plan would have been a useless sacrifice. It was impossible to expect that a division could be landed and be ready for action in less than a month, and the whole corps could not be ready before the middle of April. These delays were somewhat increased by the fact that equipment had not been packed in a tactical pattern on the transports, that is, carried with the troops who were to use it. Wavell had warned the Chiefs of Staff that the Japanese would invade Java before the end of February, and that there was little chance of repulsing invaders with the forces at hand, and pointed out that the urgent problem was then the destination of the Australian corps. As the risk of landing any more of this force in Java was too great, the question to be solved was which was the more pressing assignment of the corps, Burma or Australia. Burma was, as Wavell said "a most important but somewhat distracting commitment", and the adequate defence of Australia was vital to a successful resistance to the Japanese. He advised that Burma should revert to control by the headquarters in India, and after initial refusal the Chiefs of Staff on 21st February transferred the responsibility of Burma to the Commander-in-Chief of India. This still did not affect the issue so far as Australian troops were concerned, and Wavell concluded that at least one Australian division should be sent to reinforce Burma. The remaining corps troops and the 7th Division were then at sea, and in view of the



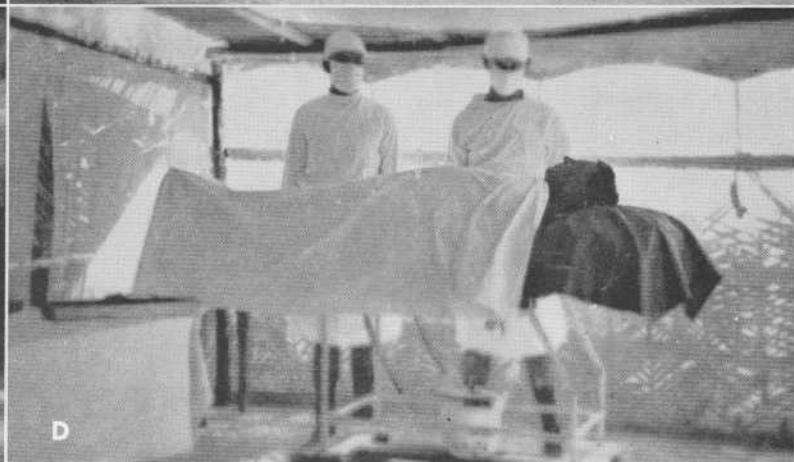
The 2/5th Australian General Hospital, Piraeus, Greece.

(Brooke Moore)



Stalag 383 Hospital Ward.

(Brooke Moore)



(Photographs taken surreptitiously during captivity on Timor by Sergeant E. Fuller)

P.O.W. camp, Timor.

A.—Admittance and discharge hut. B.—Hospital huts. C, D.—Operating theatre.

urgent need for saving Rangoon and keeping open the Burma Road, he advised that this Australian force should be diverted to Burma.

This advice was strongly supported by the British and American military and political leaders, and pending the approval of the Australian Government, Mr Churchill on 22nd February sanctioned a diversion of the leading ships in the "Stepsister" convoy towards Burma. However, after exchange of cables with the British War Cabinet the Australian Government would not agree to the use of Australian troops in the defence of Burma, and Mr Curtin, the Australian Prime Minister insisted on behalf of his War Cabinet that the ships be turned back.

On the ships there was much speculation as to their destination. Originally it was assumed that this was Java but the abrupt change of course suggested that it was Rangoon. However, hesitation and delay on 23rd February suggested a further change of destination, to Colombo. The war diary of the 2/6th Field Ambulance in the second flight from Suez summarised the movement by saying that twelve ships sailed from Bombay for Sumatra, steamed south-east for eight days, and north-west for five days, and then turning back south-west, arrived at Colombo. The postponement of movement of the "Stepsister 3B", the third flight from Suez, followed by its reinstatement a week later was explained afterwards by this rapid alteration of plans. No request was made by the British Government for forces to be sent to Ceylon for its defence, but after considerable hesitation the Australian Government turned back to Colombo two brigades of the 6th Division, accompanied by the 2/4th A.G.H., which were *en route* with the last flight.

Meanwhile a decision had been made by the Chiefs of Staff to leave in Java for its defence such forces as were available. The direction of all forces in the N.E.I. was taken over by the Dutch commanders, and the ABDA Command ended on 25th February after a brief six weeks' existence. The force remaining in Java included 5,500 British troops, 6,000 R.A.F. personnel without aircraft and mostly unarmed, about 3,000 Australians, and 500 United States artillery. British patients in hospital were as far as possible evacuated to India.

Unfortunately it did not prove possible to send an Australian hospital ship to pick up casualties from Java: the Military Board in Australia hoped to be able to turn the N.E.I. hospital ship *Oranje* round from Fremantle on 4th March, and the D.G.M.S., Major-General Maguire, arranged for extra surgical and nursing staff, but this movement was not carried out.

This episode of attempting to establish medical services in Java was a sad and frustrate one for the small parties involved. From the beginning the prospects were gloomy. The early supremacy of the Japanese in the air permitted the paratroop landing at Palembang, and the heavy bombing of Bandoeng and other important places.

Conditions in Java made improvisation very difficult. Accommodation was limited and unsuitable, roads were poor, and there was a dense native population. The facilities for evacuation of the sick by rail were

extremely meagre, and the southern ports were unsuitable for sea transport of sick and wounded. When the A.I.F. headquarters party boarded an aircraft with a very narrow margin of safety the medical staff officers left the 2/2nd C.C.S. with the greatest regret, for its function of caring for "Black" Force could have only one end. For some days the 2/2nd C.C.S. was engaged in gathering supplies of food and necessary equipment, then this unit joined with a R.A.F. hospital in Bandoeng in staffing and running a 1,200 bed hospital, which was well equipped and supplied. This was known as the 1st Allied Hospital in Java, and obtained most of its supplies from a British general hospital which had just moved after evacuating its patients. Food suitable for other than the native population was very scanty. On the 27th February some fifty patients were received from Batavia, and on the following day the total exceeded one hundred, including some air raid casualties. Bandoeng and other centres had by this time suffered severe air raids by the Japanese in which the Allied planes were destroyed in the air or on the ground.

Chaplain C. MacLeod and an orderly, Private I. R. Thurlow, were placed in charge of four patients, including Major C. Moses of the 8th Australian Division headquarters, from Malaya, who was to be returned to Australia. This party boarded a Dutch tramp steamer at Tjilitjap, where survivors from the battle of the Java Sea were taken on board with a ship's surgeon. This ship sailed, and reached Fremantle safely on 10th March 1942. The main body of the 2/2nd C.C.S. however, remained in Java caring for the casualties of "Black" Force, and with most of the defensive force was captured by the Japanese.

In all the A.I.F. suffered 2,840 casualties in Java, of these 751 were killed in action or died while prisoners, 60 were wounded, and the remainder were taken prisoner. Though efforts have always been made to keep medical units together in transit, it was fortunate that the 2/2nd C.C.S. was sub-divided into four parties during the voyage. Three of these parties were small and were detailed to supply medical services on transports returning to Australia. In this way a small nucleus of the unit reached Australia, and the unit was rebuilt there and was able to carry on the tradition of service in the war in the Pacific.

Most of the ships in the "Stepsister" convoys returned to Australia *via* Colombo, where they called to refuel; some travelled *via* South Africa. Many went direct from Colombo to Adelaide where the main reception camps were established. No outstanding medical events occurred during the voyage of the convoys to Australia. There were the customary difficulties with ventilation and water supplies, and on some ships the medical supplies were insufficient for the needs of the voyage. With the exception of the brigades left in Colombo, which were brought back to Australia on the return trips of some of the convoy ships, the Australian corps headquarters and the 6th and 7th Divisions arrived in Fremantle on various dates in March 1942. By this time the Japanese had invaded Java and had occupied Rangoon.

Though the journey was accomplished safely some damage was sustained by certain equipment. On arrival in Australia one unit, the 2/6th Field Ambulance, found its vehicles had suffered apparently deliberate damage; wheels were broken, headlights were wrenched off, and tools were gone. It would have been a catastrophe had the unit landed to work in Sumatra or Java. There might have been difficulties in assembling equipment with the units in some instances, as it was sometimes loaded on vessels other than those carrying the personnel. One field ambulance, the 2/13th, after being divided into eight parties, embarked on three different ships. This, of course, was due to the difficulties of arranging details of a large troop movement, but the damage of equipment just mentioned was presumably due to fifth column activities. These agencies were also probably responsible for the loss of a cargo of 120 tons of quinine purchased in Java by the advice of Colonel Hamilton Fairley. Great difficulty was experienced in gaining access to the factory at Bandoeng, and though the quinine was actually shipped at one port, it appeared that it was unloaded when the ship called at another port in Java, though it was not possible to discover by whose authority this was done.

THE A.I.F. IN CEYLON

The 2/12th A.G.H. had been established at Colombo for some time before the events just described. Colonel G. W. Macartney, the commanding officer, arrived on 11th September 1941, and on 23rd October the members of the unit, complete with nurses and voluntary aids, disembarked and occupied a hospital site at Welisara, where six wards were completed and others were under construction. The patients received at this stage were those on return to Australia, and others from the hospital ship *Vita*, mainly from naval ships. In January 1942 a conference was called by the Minister for Health at which tentative arrangements were made for the assistance of civilian patients should the necessity arise.

On 24th January the first Australians were admitted from Malaya. In February over 250 evacuees from Singapore arrived, chiefly women and children, and were accommodated in empty wards. They presented some difficult problems of discipline. They were later embarked on a ship proceeding to England. A useful service was developed in this hospital, that of occupational therapy, in charge of a sister who had had brief training before leaving Australia. A wide range of occupations was followed, with such success that British hospitals asked for assistance in establishing similar departments; one British nurse was attached for a training course.

During February 1942 some 200 A.I.F. patients were admitted and as in addition considerable calls were made for medical supplies for use on transport ships, application was made for replacements from the Middle East. The D.M.S., A.I.F. Middle East and other members of the medical corps headquarters visited the hospital on their way back from the Netherlands East Indies to Australia. This visit of General Burston was very valuable, as it was on his urgent and personal representation that essential

medical supplies were made available. When the 16th and 17th Brigades of the 6th Division, A.I.F. arrived in Ceylon a formation known as "A.I.F. Ceylon" was established under the command of Brigadier Boase. The General Officer Commanding in Ceylon was Sir Henry Pownall. The D.D.M.S. Ceylon was Colonel O'Hanlon, Colonel N. L. Speirs of the 2/4th A.G.H. was appointed as A.D.M.S., and Major C. H. Selby D.A.D.M.S. A.I.F. in Ceylon. The 2/12th A.G.H. continued to serve the Australian troops in Ceylon and those in passage. On 18th March survivors from H.M.A.S. *Yarra* were admitted in bad condition, suffering from exposure and exhaustion.

The A.I.F. units which arrived in Ceylon from the Middle East included the 2/1st and 2/2nd Field Ambulances, the 2/3rd Field Hygiene Section and the 2/4th A.G.H. The 2/4th A.G.H. was opened in St. Peter's School on 10th May to receive patients; the most prevalent diseases were malaria, pyrexia of unknown origin and tinea. The pyrexia was due to dengue for the most part, as there was a local epidemic. During April and May dengue appeared in all the units; the vectors in Ceylon were *Aedes aegypti* and *A. albopictus*. There was ample need for anti-mosquito precautions, as malaria was also rife. In one instance the field hygiene section found an anti-tank regiment camped in a native village on the bank of a stream where malaria was hyperendemic. The chief vector was *Anopheles culicifaciens*, and as few mosquitoes were noticed at first, nets had not been used. The general rule was then laid down that unless instructions to the contrary were given anti-malarial precautions must be observed. Though the incidence of malaria in the south-west coastal sector was the lowest in the island, the risk was always present, and could easily rise dangerously if the troops were exposed in action or otherwise in highly malarious areas. Skin complaints were prevalent, so too was *otitis externa*. Though dysentery was not a serious problem it was endemic, and an outbreak of bacillary dysentery during June coincided with an increase in the flies in the area. Venereal disease occurred in disappointingly large numbers: in June there were 110 men in a special wing of a camp hospital, and later, on representation by Major Selby, a prophylactic centre was opened. A hospital was later set up on one of the ships which returned the force to Australia, and the patients were all taken back.

The defence plans involved some medical difficulties. There were fixed defences in four areas, all with perimeters of defence, to protect Colombo, Galle, and the airports for land and water aircraft. Small holding stations were established in these areas, and the 2/2nd Field Ambulance, after some difficulty in obtaining motor transport, set up dressing stations, and was prepared to form a 200 bed hospital. A hospital, equipped with a surgical team, was budded off from the 2/4th A.G.H. and attached to the 2/2nd M.D.S. at the tea factory at Hulandawa under Major Ley. After proving its surgical capabilities by trial this was resolved back into its components, ready for immediate resumption of activity should need arise. The two field ambulances began training for jungle warfare. The 2/1st Field Ambulance set up in attractive surroundings at Horana, but pre-

cautions in water sterilisation and mosquito protection were soon found necessary. A nucleus of an M.D.S. was held ready here. Patients from the 16th Brigade area were taken to the 2/4th A.G.H. by motor ambulance, and those from the 17th Brigade area to 2/12th A.G.H. by rail.

Plans were made for medical evacuation in the event of enemy attack. It was evident that the enemy would cut off the coast road by destroying the bridges, and a reconnaissance by Speirs, Littlejohn and Selby showed that severely wounded would probably not survive the journey involved. Therefore facilities for dealing with and holding casualties near the defence perimeter were necessary. With both the general hospitals in use 2,000 patients could have been held in the area. However, fortunately, these plans were not exposed to trial. The only hostile incident during the stay of the A.I.F. in Ceylon was a bombing raid carried out by the Japanese on 5th April. No serious damage was suffered, and heavy losses were inflicted on the raiders. News of the approach of an enemy convoy of ships also reached Colombo, but the loss of supporting aircraft forced their diversion when 200 miles away.

During June preparations began for a movement of the A.I.F. from Ceylon. The force, known as "Schooner" Force for the purposes of this movement, was instructed to travel without its motor transport, with the exception of specified technical vehicles, including mobile dressing stations; the remainder of the vehicles were finally loaded in India. In July the move was successfully made, and the A.I.F. brigades and associated troops reached Australia at the end of that month. Some difficulty was found at first in ensuring that medical officers should be evenly distributed through the ships of the convoy, but with the support of Brigadier Boase this was done. This was fortunate, as a case of virulent smallpox occurred among the crew of a small ship, which might otherwise not have had a medical officer on board.

The 2/4th A.G.H. left Colombo with the force, and transferred some 300 patients to the 2/12th A.G.H., which remained behind while the 9th Division A.I.F. was committed to action in Egypt, and eventually arrived in Australia on 1st January 1943.

CHAPTER 22

TIMOR, AMBON AND NEW BRITAIN

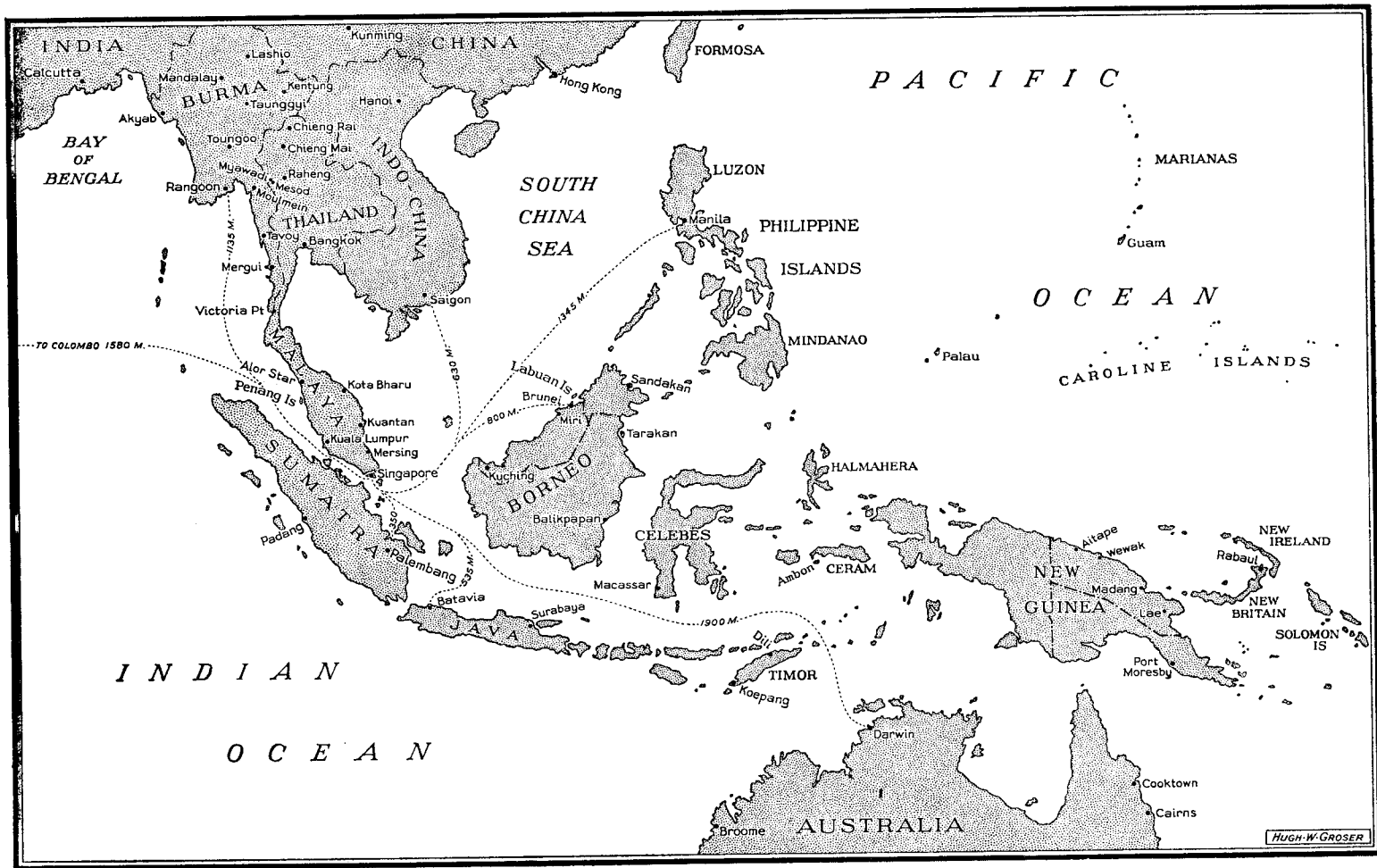
WE have seen how the movement of the 6th and 7th Divisions from the Middle East could not bring major assistance in halting the Japanese in their swift advance. Only a token force could be left in Java, and this was certain to be overrun by the opposing weight of men and arms. The Dutch and Australian Governments had already discussed the dangers of exposing important points in the Indies and the South-West Pacific to a Japanese invader, and Australian troops had been sent to defend a number of island areas. The most important of these were Timor, Ambon and New Britain, and here were sent elements of the A.I.F. as defence forces. The story of these forces must now be told in their collision with the Japanese. The climatic and medical problems of Timor and Ambon resembled those encountered in Malaya, and elsewhere in the East Indies, and those of Rabaul were similar, and provided a pre-view of the trials soon to be met in the South-West Pacific. As Independent Companies were used in these expeditions and in other garrisons, which had a more peaceful career, such as those in New Caledonia and Nauru, something will also be said of their medical organisation and methods.

TIMOR

On 12th December 1941 a force known as "Sparrow" Force was formed of detachments from Northern Territory Force and was sent under command of Lieut-Colonel W. W. Leggatt to participate in the defence of Timor. Captain L. O. S. Poidevin, A.A.M.C. and twelve O.Rs., a detachment of "A" Company of the 2/12th Field Ambulance, formed the medical establishment of the force, and the medical officers of its component units were Captain M. M. Brown, 2/40th Battalion, Captain D. Gillies, 2/1st Heavy Battery and Captain C. R. Dunkley of the 2/2nd Independent Company. Flight Lieutenant J. A. Horan, R.A.A.F. was stationed at Penfoei aerodrome, and later returned to Darwin. Captain Winter was in charge of the dental unit, and later acted as bearer officer. On 10th January the medical services were augmented by the arrival from Darwin of Major R. H. Stevens and thirty-six men, the remainder of "A" Company of the 2/12th Field Ambulance. Further reinforcements sailed in a convoy in February from Darwin, which was sent back after heavy air attacks, but Brigadier W. C. D. Veale and his staff arrived early in February to take over the command.

MEDICAL PREPARATIONS

The medical plan previously arranged was that the Dutch hospital at Koepang should be used, and a camp hospital be formed at Koepang aerodrome. Stevens and Poidevin agreed that this plan would be quite unworkable in the event of action, as both sites would be untenable, and



plans drawn up by Poidevin for a hospital at Tjamplong, fifteen miles from Koepang, were adopted. Dutch buildings were taken over, and native-type huts built with native labour, and an excellent hospital of 150 beds was established, connected with which was a convalescent depot of forty beds. An A.D.S. of thirty beds was also set up at Baboe, and aid posts were established at the Koepang airfield and in the area of the heavy battery. This arrangement provided medical services practicable under action conditions, for which the original plan laid down for the force was unsuitable. Evacuation of sick was difficult, since most of the troops were engaged in defensive works in relatively inaccessible positions in difficult country. First aid posts each with a medical orderly served isolated parties, and transport of the sick was arranged by stretcher to waggon loading points on roads, and thence onwards by motor ambulance. Some of the positions were too difficult even for this method, and for these Timor ponies were obtained.

The health of the men was fairly good, though exhaustion was common, owing to the hard conditions of work. Malaria was prevalent, as might be expected, for the troops lacked proper protective clothing, and anti-malarial work was mostly impracticable. Oiling of mosquito breeding places was very difficult owing to the nature of the terrain, and in the wet season was ineffective. Quinine only was available as a prophylactic, and even 10 grains daily was not efficient as a suppressive. The 2/2nd Independent Company was attacked by a sudden outbreak of malaria which assumed epidemic form in the unit within a fortnight of its arrival. Stevens flew to Dili, where the company was then based and investigated this: further reference will be made later to this and other manifestations of malaria in this unit. Diarrhoea was common, and though apparently related to flies and imperfect hygiene, it was not clinically of the dysenteric type. Sanitation was poor until firmer control impressed officers in charge of parties with their responsibilities. Some disturbances of the digestive tract were apparently dietetic. The independent company at first lived on the ordinary ration with the addition of rice and some native foods, but with greater usage and experience found they could manage well on properly prepared local food.

Tropical ulcers troubled the men considerably, they arose in the first place from abrasions and other minor injuries easily inflicted in this rough country on men only wearing shorts and shirts. Infection occurred readily and the more severe lesions were most successfully treated by curettage or excision and the application of iodoform. The medical officers considered that the protection of the limbs by long clothing was the best prophylactic.

ACTION PHASE

From the end of January the Japanese began to bomb the Koepang area, and numbers of men were wounded. On 18th January warnings were received of a Japanese landing, and patients who could be readily moved were removed from the A.D.S. at Baboe to the Tjamplong camp

hospital. Those who could be discharged were returned to their units.

On 20th February there were heavy bombing attacks, followed by landings of paratroops at Baboe, clearly seen from the hilly site at Tjamplong. Ambulances with wounded got through from Koepang till paratroops blocked the road. Brigadier Veale and his staff arrived, and agreed that casualties could be expected, especially if the main force fought through to Baboe; therefore they decided that the hospital must remain where it was. A medical detachment consisting of a Dutch medical officer and four other ranks with supplies was sent back with the commander, who intended to move back to Soe, whither Dutch parties were making their way. Communications by road and radio with the main body were cut off, and nothing was heard at Tjamplong until the 23rd, when an armoured vehicle arrived, an advance patrol from the main force. It was then learned that the commander expected the force to be surrounded by overwhelming Japanese strength. Bombing was heard, and Japanese troops entered the hospital area. They allowed the hospital to continue work for a week, but refused to allow a medical detachment to proceed to the aid of the main Australian force.

CAPTIVITY ON TIMOR

On 3rd March, leaving a small party to look after patients who were too ill to move, the medical section went under orders to Oesapa Besar, where over 300 sick and wounded lay in a coconut grove practically devoid of shelter. Medical supplies were exhausted, and the medical officers had been forced to leave men unattended, especially as night work was not permitted. The Japanese allowed a truck to bring supplies from Tjamplong, but much had been looted. Engineer officers and a working party constructed huts, and gradually a fairly comfortable hospital was made. A theatre was built, mosquito netting and palm leaves being used; before this was completed many men with gunshot wounds were operated on in the open without any cover. The Japanese provided some medical material also, and thus a three months' supply was to hand. Parachute silk was found very satisfactory for sutures. A Dutch dispenser made ether out of alcohol obtained from the Japanese, and sulphuric acid: later he made alcohol from saki wine. Finally the operating table and autoclave were brought to the hospital and reasonable work could be carried out. The prisoners' camp was alongside the hospital, and proper kitchens, laundry and latrines were also built using material from neighbouring native huts. This work was done with a minimum of equipment and at the cost of much labour by exhausted men. About 300 patients were usually in hospital; they were looked after by three medical officers, forty A.A.M.C. personnel and thirty-five combatant troops were attached and trained in medical procedures.

Some nutritional disturbances were soon seen among the men, and skin troubles were common, particularly tropical ulcers. The difficulty of giving adequate first aid to the patients with these lesions increased the frequency of infections, and shortage of supplies added to the difficulties. Bone

necrosis was not uncommon, and amputation was necessary in one instance. Malaria was very prevalent, usually of the benign tertian type, though many cases of malignant tertian were seen, including some cerebral. Several men died suddenly at night: it was thought they had cerebral malaria. One man with epileptoid fits followed by coma recovered after several intravenous doses of quinine. Men were constantly coming to hospital with malaria contracted in the farm established by the Japanese in a swampy area full of breeding mosquitoes. Only quinine was available, and that in restricted quantities, and relapses were frequent. Cerebral types were treated with intravenous injections of quinine and urethane. Diagnosis was placed on a firm basis when a microscope was at last obtained from the Japanese. The commonest nutritional deficiency states were oedematous beriberi and oedema due to hypo-proteinaemia. Peanuts and bananas were used in treatment. Other manifestations of vitamin *B* deficiency were seen, such as scrotal dermatitis, angular stomatitis and at a later period, amblyopia. Some dysentery was encountered, including a few cases of amoebic infection.

There were 120 battle casualties needing surgery. Most of the wounds were infected, though it did not appear that streptococcal infections occurred. Maggot infestation was seen in many wounds; these wounds were invariably clean. Two amputations were necessary, but many men with bone infections and sequestra did well. Diphtheritic infections both of the throat and of wounds occurred, but no antiserum was available.

On 27th July Major Stevens was taken off Timor with other senior officers of units and about twenty-five N.C.Os. and O.Rs. Captain Brown then acted as S.M.O. and Captain Poidevin was in charge of the 2/12th Field Ambulance detachment and the hospital, which then had about 190 beds. Further accommodation was provided by the erection of more native huts, each holding eighteen beds.

Medical supplies were scarce, and the stocks from Tjamplong were shrinking: Stevens took some stores and surgical instruments with him. The Australian officers were taken to Batavia, and later to "Bicycle" camp.

CAPTIVITY IN JAVA

On 23rd September 1942 the Australian and Dutch at Oesapa Besar were moved to Surabaya *via* Dili, and thence to Batavia by train. Conditions on the ship were very bad, all the men were kept in the hold with no food other than two scanty meals. The Australians were sent to Tanjong Priok where there was a well-established camp with some 3,000 prisoners of various nationalities. Conditions were fair, and some goods could be brought at a canteen. The health of the troops was not so good in Java; a census showed that 90 per cent had malaria on Timor, and relapses could not be controlled. Sanitary conditions were not good, and both bacillary and amoebic dysentery occurred.

Nutritional diseases increased in number in Java. Encephalopathic types of beriberi were seen with stupor, raised pressure of blood and cerebrospinal fluid, and convulsions. Cases of oedema, painful feet, lesions of

tongue and mouth, scrotal dermatitis, sensory disturbances in the limbs and anaemia were seen in increasing numbers. Ocular affections were numerous; these included corneal ulcers, night blindness and amblyopia due to dietary deficiencies. A camp hospital of rough type was in use; the standard of work was much enhanced by the use of medical orderlies, who were paid for their work. In January 1943 all but the sick among the Australians were moved to Makasura camp, but later were concentrated again at Bicycle camp, at Tanjong Priok.

Further information about Australian prisoners in Java is given in a later chapter.

THE INDEPENDENT COMPANIES

The narration now returns to Timor where the 2/2nd Independent Company had been engaged in harassing tactics against the Japanese. When the enemy landed in Timor the company, then in Dili, took to the bush, where the experience gained by the men enabled them to prepare and subsist on native food. Supplies were dropped from the air after the beginning of March, but many of the parcels were damaged, and many others were never recovered. From August onwards arrangements were successfully carried out for monthly two-way communication with the mainland, and the company's requirements could thus be satisfied.

After the Japanese took Dili on 22nd February 1942 the independent company was mobile, and its R.A.P., the centre of its medical activities, was also mobile and independent. Captain Dunkley the R.M.O. moved about in response to directions from the commander sent by native runners. On receipt of news from a runner that he was needed he would leave local medical affairs to be dealt with by Corporal Sparkman, and move under guidance of natives, who were faithful and cooperative and worked well with the friendly Portuguese. Rations were largely bought from natives or markets: stores were replenished from Australia. Ambulant casualties often acted as carriers.

From February to May the moves of the unit through Portuguese Timor took Dunkley over many miles of mountainous country, traversed by rough paths only and intersected by rivers. His R.A.Ps. were sited in vacated buildings, police posts, schools, huts, very occasionally in a small hospital, sometimes under trees. He was in occasional personal touch with Major Spence, the commanding officer, and with Brigadier Veale. Some of the casualties treated were serious, and included a severe wound of the jaw, repaired under chloroform, and necessitating tube feeding afterwards, and a compound fractured femur, transported in a Thomas splint by native stretcher bearers. In March a message ordering surrender reached the party, but patrol leaders summoned from their mountain fastnesses agreed with the commanding officer that no surrender would be contemplated. Dunkley's practice also included occasional Portuguese commandants, and even took him to Marabo, where there were medicinal baths and a spa on continental lines. After narrowly missing the Japanese, a medical party kept a rendezvous with a flying boat at a beach from

which patients were ferried to the aircraft on a prepared raft, and thus were returned to Australia.

From June till mid August the R.A.P. was at Ainaro running smoothly; food was good and mail occasionally arrived, but after hearing Japanese bombing early in August the company patrols heard news of a Japanese landing. The R.A.P. moved to Alas and there Captain Dunkley met Captain Hennessy the medical officer of the 2/4th Independent Company and other members of this unit, which had just arrived on Timor. Unfortunately *Voyager*, the destroyer which had transported them, was grounded on the coast and thus the position was revealed to the Japanese. For a time both companies moved on, patrols of the 2/4th working in conjunction with those of the 2/2nd, but at the force headquarters in October such evidence of Japanese activity was found that it appeared that movements could not be made undisturbed. After a delay from this cause more sick were embarked and returned to Australia, and a new area for the R.A.P. was found, where huts were built and more sick accommodated. At the end of November 1942 the 2/2nd Independent Company moved all the sick to Fatu Caue and early in December embarked on a Dutch destroyer for Darwin. The 2/4th Company continued working along similar lines, but in January 1943 it was also returned to Australia.

The medical work done by Dunkley and his assistant orderlies was of a high order during the ten months of active operations against the Japanese in Portuguese Timor, and equalled the work of the unit in resource and courage. The chief illness encountered was malaria. The whole unit was smitten a fortnight after its arrival, and this small epidemic was of characteristic type affecting unprotected persons. Of fifty-five blood films examined by the Dutch sixteen showed M.T. and nine B.T. malaria, a proportion which was probably significant. Seventy per cent of all admissions were due to malaria, primary or relapsing. Estimation of the recrudescence rate was calculated from 169 case histories showed 1.8 recurrences per man, with a maximum of 11, but men observed in the headquarters and four platoons had an average of 3.3 attacks. Five grains of quinine bisulphate daily was the suppressive dosage employed, but at first only the powdered drug was available, and as there were no scales the dose was a matter of guess-work until tablets were obtained.

The usual other tropical maladies were experienced by both independent companies, and Colonel N. D. Barton, A.D.M.S. of Northern Territory Force noted that on the return of the 2/4th Independent Company practically every man had tropical ulcers, and suffered from flatulent dyspepsia and recurrent diarrhoea thought to be due to a deficiency of the vitamin B complex.

Captain Dunkley made a special report to the commander of "Sparrow" Force in May 1942 which contained some important observations of medical work with independent companies. This is here summarised.

It was recognised that the company might operate in remote areas, out of contact with other forces and that its base might move at very short

notice. Platoons and sections might also have to leave their own bases quickly. Stores had to be carried over difficult country and might have to be packed in silence and in darkness. Such moves might entail taking patients with the company. Dunkley recommended that the medical officer should organise his medical staff so that two N.C.Os. should be attached to his headquarters and a corporal to each platoon, but should visit the platoons frequently. Equipment needed careful packing not in ordinary cases, but in containers of durable nature; liquids were best carried in non-breakable containers. Later it was found that collaboration with the medical officer before the company left for its destination was most desirable, and equipment and stores could be suited to locality. It was obviously as important to omit useless stores as to ensure the safe packing of necessities. Full schedules were of course drawn up, but could be modified to suit circumstances.

AMBON

Ambon was important as an air and sea base, and was one of the islands which for the purposes of Allied defence, were really one with Darwin. The sending of "Gull" Force resulted from discussions with the Dutch Government of N.E.I., and the Australian Government agreed to supplement the garrisons on Ambon and Timor. Therefore on 7th December Brigadier Lind received orders to move the 2/21st Battalion from the Northern Territory to Ambon and the 2/40th to Timor. "Gull" Force sailed from Darwin with a total of 1,170 men, and disembarked on Ambon on 17th December. The Dutch garrison of the Molucca Archipelago concentrated as much as possible on Ambon, and some reinforcements had reached there from Java. Early in 1942 the forces on the island were commanded by Lieut-Colonel Kapitz, comprising Dutch and Indonesian troops as well as "Gull" Force.

"GULL" FORCE

Brigadier Lind had pointed out after the initial reconnaissance that the force was inadequate, and Lieut-Colonel Roach, commanding "Gull" Force, expressed the same view forcibly both before and after the force sailed. The force included the 2/21st Battalion, part of the 2/11th Field Company, part of an anti-tank battery, a light aid detachment, detachments from the 2/12th Field Ambulance, and signal and dental sections. The medical services on Ambon included Captain W. Aitken, R.M.O. of the 2/21st Battalion, Captain P. M. Davidson and Captain S. B. M. White from the 2/12th Field Ambulance, and forty-eight O.Rs. On arrival in Ambon the force occupied two areas, one near Ambon town, and the other at the Laha airfield on the northern promontory fronting the Bay of Ambon.

Neither the military nor the medical position was satisfactory. The Australians and the Indonesians did not work together successfully partly owing to language difficulties, and the hilly difficult country made wide dispersal of troops necessary. At Laha malaria was very prevalent, and

at first until dyed mosquito nets were obtained, no nets were used, and there was a high malarial risk to troops having to occupy slit trenches at night. Quinine was taken as a prophylactic. Arrangements for water sterilisation were not well maintained, and considerable wastage of men took place from malaria and dysentery: much of this was in the opinion of the medical section avoidable. An A.D.S. was set up at Laha, and also Galala, and the equivalent of a clearing station on a small scale was set up near Kudamati west of Ambon town on the road to Eri, towards the tip of the southern peninsula.

ACTION PHASE

On 6th and 7th January the Japanese bombed Ambon, dropping thirty-three bombs on three points, but did little damage. Roach thought the outlook was unfavourable and that the force would find the position untenable when the Japanese made substantial landings as expected. On 16th January Lieut-Colonel W. J. R. Scott arrived by air from the Army Headquarters in Melbourne, and took over the command, and Roach returned to Australia. The Allied forces on Ambon were disposed so as to oppose landings on areas in the neighbourhood of the Bay of Ambon and to carry out delaying actions. The commanders were aware that the Japanese had a convoy of ships at Menado in North Celebes, and the approach of a strongly guarded convoy was reported to the force on 29th January. Allied air protection was no longer practicable owing to losses, and by 30th January all planes were withdrawn. The following day the Japanese made several landings and in superior strength quickly crossed the Hitoe Peninsula, attacking from the south, instead of the north and west as expected. The swiftness of their movements disorganised communications and caused confusion.

On 1st February Japanese troops were seen on the road using two Australian ambulance waggons for the transport of captives, indicating that the medical post was in enemy hands. The next day defenders, under continuous shelling and small arms fire were exhausted, and their supplies of water and food were slender. The only medical post, at Eri, had few facilities or supplies left, but still had some stretchers and bearers. Numbers of battle casualties were being looked after, and fear states were occurring more frequently, but lessened by firmer handling. On 3rd February a conference of Australian officers in the Eri area revealed that the situation was very bad: though there was only twelve hours' supply of water left they decided to defer surrender in the hope of air support from the mainland. It was learned, however, from a letter from Kapitiz that the Dutch force at Paso had capitulated on 1st February, and the Japanese flag could then be seen flying over the Laha area. In this critical position Scott ordered Captain Aitken to advance into the enemy lines to obtain the terms of surrender of the force at Eri. Aitken had some twenty wounded under care at his aid post, and protested that this was not his duty, but Scott gave the order to a non-combatant because he should have protection of the Red Cross.

Though stiff resistance was put up by the small Australian forces, dispersed in difficult country, the Japanese were in far greater strength. The Australian positions had been under attack from land, air and sea, and any hope of effective reply had faded.

Moving some of the wounded was trying to all concerned: Lieutenant S. F. Anderson, wounded in the legs, was carried with difficulty until the bearers met a Japanese party which allowed the stretcher to go on in front, and later actually helped to carry it. An escape party was organised at Laha, but Captain White decided that his place was in his jungle aid post with those wounded unable to move. Later he was killed in the Laha area.

CAPTIVITY ON AMBON IN 1942

After their capitulation the Allied forces were kept on Ambon until near the end of October 1942 when some of the prisoners of war were removed to Hainan Island. The conditions prevailing in the prison camps on Ambon were much better in the early period. The Australians occupied barracks on the original site used by "Gull" Force on arrival, at Tan Toey near Galala on the southern side of the island. The site had good water and sanitation, and was well drained and free from malaria. As they became more dependent on issued rations their diet became more inadequate and was notably deficient in fat and protein.

Following the successful escape made by one organised party the Japanese regime became much more strict and severe, and there were lamentable episodes of violence and brutality. In some ways the Australians on Ambon were reasonably comfortable until November 1942 and some time afterwards. They were permitted to retain their own stores of food and drugs, and could supplement Japanese rations by local purchases of meat, eggs, fruit and vegetables. They also grew vegetables in their own gardens. The advent of a new commandant altered this; he refused to grant privileges and treated the prisoners with neglect and cruelty. Their nutritional standard, which had been reasonable, soon deteriorated and deficiency states became common. The troops were looked after by Captains Aitken and Davidson, whose efforts were greatly curtailed by the paucity, indeed absence of drugs, so that malaria and later beriberi could not be dealt with adequately.

PRISONERS OF WAR ON HAINAN

Late in October the prisoners were divided and on 25th October 1942, 263 Australians were sent on the freighter *Taiko Maru* to Hainan Island. From 5th November 1942 till 4th September 1945 these men were looked after by Aitken at Bakli Bay Hainan, a barren, hot and depressing place where they were housed in coolie barracks and slept on grass mats. Sanitation was primitive, a neighbouring swamp bred hordes of mosquitoes, and the diet was grossly inadequate. The Japanese on Ambon had directed that all sick and debilitated were to be taken to Hainan, as hospital facilities would be available there. This was completely untrue; there was no

separate accommodation for the sick, except such as the prisoners could build for themselves. Drugs were practically non-existent; medical supplies when occasionally produced by the Japanese were in ludicrously small amounts. The men including the sick were forced to do constant hard manual labour, and were misused with violence by their guards. The Japanese insisted on a given number working each day regardless of physical condition.

Beriberi was soon made manifest by the worsened conditions: forty cases appeared in the first month on Hainan. Diarrhoea was also common, and arose from various causes: both these conditions tended to increase mental depression, particularly seen in men who had to work outside their camp area and were subjected to constant contact with the Japanese. The commander realised the effect of discipline on morale, and ensured that a high standard was maintained. Aitken thought that the men's diet had never been very satisfactory in Darwin or in Ambon, and suggested that even then there may have been some deficiency in vitamin *B*, but the diet on Hainan was grossly deficient. Vitamin *B* was issued by the Japanese at irregular intervals but there was only enough to treat the serious cases. After repeated complaints they furnished dietary supplements as well, but not till the hospital was full of oedematous and ataxic men. Practically every man in the force had oedema of the legs, and every day in the working parties were many men who were hardly able to stagger, though this did not save them from physical violence. The Japanese medical officer even demonstrated cases to non-medical officers for their amusement.

These conditions improved greatly in 1943, but deaths still occurred, particularly among the older men who would not respond even to large doses of vitamin *B*. Cardiac beriberi was seen, and responded well if sufficient dosage of thiamin could be given. Relapse of the cardiac condition was often seen from exertion. Cases occurred with no oedema, but dyspnoea and nocturnal breathlessness; these did not respond to ordinary medication, but intrathecal administration of vitamin *B* was reported as successful. Since every man suffered more or less from deficiency of vitamin *B* a wide range of symptoms was seen, such as minor degrees of oedema, paraesthesiae of the legs, and dysfunction of the bladder, particularly nocturnal diuresis which was almost universal. Enough thiamin was issued to treat only the most serious cases, and none at all was supplied in May and June 1943 and very little till the end of August 1945. Though the Japanese would not produce some essential drugs these were obtainable, since some was acquired by the prisoners' own trading organisation. Early in 1945 a number of men died from a combination of starvation and vitamin deficiency: gangrenous patches on the legs were then frequently seen, and dysentery was also common. In 1945 the dietary deteriorated again and further deaths occurred in this period: the whole force suffered severely from starvation and disordered nutrition. In addition to obvious malnutrition and clinical manifestations of vitamin *B* deficiency there was also evidence of lack of vitamin *C* shown by petechiae on the arms and legs. In March 1945 the diet was reduced to

300 grammes of polished rice a day, and the caloric value fell from 2,662 in 1942 to 1,470 in March, 1945. Great loss of weight followed: a weight of 112 pounds was averaged, though half the men had oedema of the legs at the time, which increased the apparent body weight. Careful records were compiled by Sergeant D. G. P. Foley showing analysed rations as supplied each month, together with the average weight of the men, and the prevalent diseases. These show convincingly the loss of weight suffered by the men and its relation to the food ration. Fortunately, after March 1945 the changing fortunes of the Japanese brought improvements in their conduct, and no more work was required outside the camp. The diet was increased again in May 1945 but the Calories only rose to 1,551 per day in August.

Dysentery was very common and treatment was difficult. Amoebic infections occurred but very little emetine could be obtained. Serial inoculations with *T A B* vaccine were carried out, but nevertheless numbers of cases of proven paratyphoid *A* occurred in 1944. Assistance was given in the bacteriological diagnosis by a sympathetic and helpful Japanese commander.

Malaria was common both on Ambon and Hainan. When atebrin and plasmoquine were available, chronic resistant cases were cleared up readily, but on Hainan relapses were frequent. Practically everyone in camp had malaria, mostly benign tertian in type. About 25 per cent of the men had malignant malaria, and hepatic and cerebral symptoms were common, and needed large doses of quinine to cure them. Adequate supplies of quinine were not always obtainable, and early recrudescences were noted. A microscope was available during the first year but was then taken back; after a time Japanese examined slides from all men every fortnight, but the results were returned too late to be of use in diagnosis. Quinine alone was available in the later periods and was much less effective alone than with atebrin and plasmoquine in addition. Intravenous administration of quinine was found very effective.

Other common illnesses were respiratory disease, for which sulphanilamide was available only for a few months; roundworm infestation which could not be satisfactorily treated, and skin conditions, particularly of the infective type, for which few drugs were obtainable. Conjunctivitis was very common, and was thought to be due chiefly to physical causes. In the later period when beriberi was common, dimness of vision was also noted and was correctly attributed to dietetic deficiencies. Up to 50 per cent of the force suffered from some impairment of eye sight.

Hospital accommodation was very poor throughout, merely barracks of the most meagre type. Usually no light was permitted at night, though no such restrictions were observed by the Japanese themselves. Facilities for surgery were afforded at first in a Japanese hospital, but the medical officers looking after the prisoners were not allowed to use its equipment. The only bedding that could be used was brought from Ambon, and no ordinary hospital equipment at all was supplied by the Japanese. When fifty or sixty men with cardiac beriberi, dyspnoea and diarrhoea were in

hospital the scene was shocking to the most primitive conscience. The stretcher bearers and orderlies worked admirably and carried out their duties cheerfully and as efficiently as the impossible conditions permitted.

During the period November 1942 to September 1945, 2,430 men were admitted to hospital on Hainan, and there were among 263 men 60 deaths due to disease, chiefly beriberi, dysentery, starvation and malnutrition.

LATER PERIOD OF CAPTIVITY ON AMBON

Meanwhile the remainder of the Australians were left on Ambon, in the medical care of Captains Davidson and Marshall and sixteen orderlies. A camp hospital was established in which there were some facilities for treatment. On 15th February 1943 a Japanese bomb dump sited in the camp exploded during an air raid, and Captain Davidson and nine other men were killed, and twenty-five wounded. Captain J. H. W. Ehehart, a Dutch medical officer and Captain Marshall the dental officer established a hospital in a wrecked hut. Here they provided forty to fifty beds, many of which were home made, and used salvaged equipment and supplies. Marshall kept records and obtained supplies from various sources; for example, Japanese lubricating grease was a useful substitute for "Vaseline". The diet deteriorated until 75 per cent fell ill, half the men were on sick parades which lasted from before dawn till night, and seventy-six dying men were in hospital.

Yeast was made by Marshall and used with some success for beriberi, and attempts were made to grow soya bean. Most of the men had tropical ulcers, with a high proportion of bone involvement, and hookworm due to lack of boots and a breakdown of hygiene, was also common. Marshall did some dental work with an engine extemporised from a bicycle, and made dentures of aluminium. Affections of the eyes were frequent, such as conjunctivitis and corneal ulcers, so too were skin lesions of the irritative and infective varieties.

Only 121 men out of 528 returned to Australia, and their privations and suffering would have been even greater had not such service been given to them both on Ambon and Hainan.

In September 1945 Lieut-Colonel M. L. Powell of the 2/5th A.G.H. at Morotai found that of 280 recovered prisoners of war who passed through the hospital those who came from Ambon and Hainan were in the worst condition. Some were very ill, emaciated, anaemic and oedematous, and needed intravenous resuscitation with glucose, plasma and blood. Ascites was seen in some men; one required paracentesis, and normal renal function was restored only by an injection of "Salyrgan". Many needed treatment for malaria, and some 25 per cent had worm infestations of different kinds. Eighty per cent of the men from Ambon showed evidence of thiamin deficiency, with ataxia and absent deep reflexes. Nerve deafness and optic atrophy were also seen in two men: lesser degrees of cranial nerve affection also occurred.

The mental state of the most seriously ill men attracted special attention. An initial phase of garrulous excitement was succeeded by a period of

depression, which was often profound, but after a few days full recovery followed. There appeared no reason then to doubt that these men would regain a normal mentality.

NEW BRITAIN

In March 1941 a force arrived in Rabaul from the mainland as part of the chain of garrisons fanning out across the Pacific Islands north-east of Australia. This force included the 2/22nd Battalion of the 23rd Brigade, a coastal defence battery with attached engineers and signals, small A.A.S.C. and ordnance details, and a detachment of the 2/10th Field Ambulance. Four months later an anti-aircraft section was added, and after another two months an anti-tank battery. The battalion commander Lieut-Colonel H. H. Carr was in charge at first; in October Colonel J. J. Scanlan took over command as Area Commandant. In December 1941 the No. 24 Squadron R.A.A.F. was sent to Rabaul. There was also a part-time company of the New Guinea Volunteer Reserve Force.

Major E. C. Palmer, S.M.O. of the force, and Captain S. E. J. Robertson were detached from the 2/10th Field Ambulance, with twenty orderlies; Honorary Major J. F. Akeroyd was R.M.O. of 2/22nd Battalion, and Captain H. N. Silverman medical officer to the anti-aircraft regiment. The army medical party also included six nurses, and had sufficient equipment to provide for a sixty bed hospital, including theatre equipment, with possible expansion to ninety beds. In addition the civil administration had three medical officers of the Department of Health; Dr E. T. Brennan was the senior health officer, and had under his administration civilian nurses and assistants. There was one private practitioner and there were hospitals for both Europeans and natives. Captain V. G. Bristow was stationed at Kavieng on New Ireland in charge of the medical arrangements of the 2/1st Independent Company there.

There were several main roads leading to the town area of Rabaul which offered good transport, but farther inland the Gazelle Peninsula was served only by narrow tracks between villages. Rabaul itself was almost free of malaria because of the absence of surface water, which rapidly drained into the pumice of the top soil, though an ample water supply could be drawn from the water table below. Malaria was endemic on the island, and the malignant type was known to be common; stocks of quinine bisulphate were held and a quantity of the sulphate solution.

A hutted hospital was established, but had to be abandoned because in July the volcano Matupi began to erupt, and though there was no lava flow, scoriae and dust continued to descend over considerable distances. Dust lay six inches thick on Akeroyd's R.A.P.; it invaded all water tanks and produced a high acidity in the water, due not to sulphur but hydrochloric acid. The hospital was seriously inconvenienced by this dust, though a chlorinated supply of water was arranged by the battalion hygiene service to both the hospital and Government House. This volcanic activity persisted throughout the whole period; the relation of a high concentration

of silicate dust in the air to possible future pulmonary trouble was not sufficiently realised at the time, but five out of sixty-six officers and men exposed to it were found to have active tuberculosis, two during subsequent captivity and three at a later period. The headquarters of the administrator moved to Lae in September, but further plans regarding the nature and scope and administration in Rabaul did not mature.

Major Palmer set up a hospital in tents, and used civilian buildings for surgical work. In December the hospital occupied Government House and there extemporised a theatre. Useful training was given to the orderlies particularly the bearers by sending them in turn to the native hospital for experience.

The general health of the men was good during this period. Before leaving Australia, Akeroyd had rejected over 230 men medically examined for the force, and the high physical standard achieved was of value later. Malaria prevention was carried out by native labour in the areas under civilian control, where Dr Brennan was in charge, but in battalion areas dusting, oiling and spraying were carried out by the soldiers with little outside help. Very few cases of M.T. malaria were seen at this time. Mild dysentery of Flexner type was encountered, and a few cases of radiculitis were also seen, thought to be of infective origin. Tinea was frequent; tropical ulcer was seen occasionally only in the defence force.

THE JAPANESE ATTACK

In the early morning of 4th January the Japanese air force attacked the Lakunai and Vunakanau aerodromes with land and sea-based bombers. On 9th January a convoy of ships was discovered at Truk, 700 miles to the north, and as a prelude to landings the enemy attacked again from the air on the 20th and 22nd. No casualties resulted from the first raid, but some members of the R.A.A.F. were wounded in the raid of 20th January. The next day it was known that an invasion by sea was imminent, and as losses of defence planes had been inevitable against the vast numerical superiority of the enemy in the air, the remaining planes were returned to Australia; a Hudson took back wounded on 21st January.

On this day most of the troops were removed to Vunakanau, seven miles to the west, though with some lack of psychological insight the pretext of the move was given out as an exercise. Palmer was warned to destroy all the medical records.

On 22nd January the population of Rabaul was evacuated, and demolitions were carried out: unfortunately a heavy explosion wrecked radio communication with the outside world. The battalion and other troops took up compact defensive positions so disposed that a hospital was on each flank, Rabaul on the left, and Vunapope on the right. Captain Silverman had an R.A.P. with the coastal battery; this had also to share in the withdrawal: Silverman himself became ill and was in hospital before 21st January.

On the 22nd, when the fortress was bombed Captain Silverman, chafing at the inadequacy of alternative plans for evacuation of his casualties, discharged himself from hospital in his pyjamas, and making his way to the fortress took charge of the arrangements. He then dressed and controlled his part of the evacuation of the fortress, and took over a sub-R.A.P. with "A" Company of his battalion, remaining in action throughout the period of the withdrawal.

The strong naval forces moving from the Duke of York archipelago were now close at hand, and at 1 a.m. on 23rd January the Japanese landed in Matupi Harbour; and other landings followed. Demolitions and heavy attacks put the guns out of commission, and a number of casualties reached hospital during the night. Well before the Japanese completed landings round Simpson's Harbour and before casualties had occurred, except in the fortress, the patients and staff of the hospital on Namanula Ridge were removed safely to Vunapope Mission at Kokopo by direction of Colonel Scanlan. Communications between the commander and Lieut-Colonel Carr in charge of the battalion were very uncertain, but it became evident that the invading force was too strong to be repulsed, and two escape routes were planned, one to the north to the coast and the other to the south. Palmer decided to leave the patients and nurses in the native hospital at Vunapope and the staff of the Health Department was transferred to Vunapope Mission, where there were in addition a mission doctor and some mission sisters. Chaplain J. May assumed control, and remained with two orderlies with the patients, and protected them and the nursing staff when the Japanese arrived.

Palmer then set out to rejoin the force moving south which it appeared would be without a medical unit; this meant a long detour on bad roads. He therefore took Captain Robertson and some O.Rs. and with stores of food and medical equipment in his transport left to follow the headquarters of the area back to the centre of Gazelle Peninsula. Akeroyd, who was not seen by Palmer before he left, was concerned about patients at the forward posts. He did not hear details of the altered hospital arrangements at the time, but only later on 11th February from a patient who had left the hospital, and finally joined the party on the north coast.

The Japanese soon infiltrated through the areas around the northern part of the peninsula. They allowed the nurses to remain at work in the hospital; there were seventy patients and others coming in from the south coast; facilities for work were very limited, but the nurses gave the sick what general care they could. They were subject to considerable but not serious disrespect, but on one occasion a nurse slapped the face of one interfering Japanese, after which there was no trouble. They were placed in a separate compound, and later were taken to Japan. The force lost its cohesion in the course of retirement, as was inevitable in such country, in which small parties were more likely to be successful in escaping once organised resistance ceased to be possible against a force of some 17,000.

Though numbers of escape parties made their own way they maintained reasonable organisation, and some of the individual leaders were con-

spicuously successful. The larger number of the retiring force headed south. At the centre of the peninsula was an assembly area, from which the commander planned to attempt to reach Wide Bay on the south coast, where flying boats had taken off some civilians. Palmer's party left their transport after travelling some distance and proceeded on foot. Akeroyd accompanied the part of the battalion which made for the north coast, taking some sick with him.

THE NORTH COAST PARTY

Two companies were directed by the battalion commander to the north coast, and crossed the Keravat River in good order. There was little food in the first couple of days, and many of the men felt weak and giddy. The escape parties tried at first to use trucks and carriers, but the mountains and jungle and streams to be traversed inevitably meant exhausting travel by foot.

Captain Cameron, second-in-command of "C" Company of the 2/22nd Battalion found that "hordes of Japanese" were pouring through the Vunakanau area, but a number of Australians were gathered together, and though some surrendered at Keravat many others successfully crossed the river there and pressed on along the north coast. Captain Appel, commander of "C" Company, found Cameron with 160 men, some of whom were suffering from sickness and hunger. Farther on at Lassul Bay the troops were dispersed into fifteen groups, as the Japanese had landed a large force at Massava. There were in all some 220 troops dispersed on the north coast.

One of these groups was under the care of Major Akeroyd who stayed at St. Paul's mission and used this as a centre for treating men unable to go on by reason of illness and exhaustion. The general plan of escape by the north coast became clearer and although the Japanese made further landings on 14th and 15th February and captured a number of Australians, contact was made with Moresby by Cameron's party; they used a rehabilitated teleradio set, and by 25th February arrangements were well in hand for a sea escape to New Guinea, troops reaching Pondo some by foot, and a small advance party by water under Captain Appel. Eventually an efficient evacuation system was organised and troops were ferried down the coast to points from which they could cross westward to New Guinea and safety. A party of 214, including 162 A.I.F. and N.G.V.R. were picked up in the *Lakatoi* and arrived at Cairns on 28th March. The men suffered many hardships, and only the fit could cope with some of the cross-country marches where these were necessary: the sick were brought round the coast where possible. Malaria exacted a heavy toll from them, and little relief could be given.

Akeroyd concentrated a number of casualties at St. Paul's where the German missionary Father Stablemann showed him the greatest kindness, and gave him food, drugs and dressings for his men. He was there two and a half weeks while more sick and wounded kept coming in. The Japanese apparently expected larger Australian forces round the coast,

and their destroyers shelled an area left only the day before. However a note arrived for Akeroyd from a German interpreter with the Japanese, threatening destruction of the mission unless it was vacated by the troops. Akeroyd thereupon decided to stay with the sick, as he now realised the hospital position on the island, in the light of the information which only reached him on 11th February, but he left the mission because of the risk it ran from Japanese attack. He therefore established a camp for his sick and wounded on the beach at Massava four miles from the mission. The men caught goats for meat, and later killed a cow for food. They had no proper transport, and tried to harness a water buffalo to a cart for moving patients but without success. The Japanese followed the troops retiring along the coast, but apparently had no jungle-trained scouts. They captured Akeroyd's party, but found that the condition of a number of the sick imposed some anxiety on them, and on 14th and 15th February they took these men to Rabaul. The Japanese took no further action against the troops in the area till 6th March, and left the medical party at leisure. Akeroyd was officially taken prisoner six weeks after the first landing. Most of the sick and the few with surgical conditions did well.

In Rabaul he met Captain Bristow who had been brought from Kavieng. We may here note that Kavieng on New Ireland, was attacked by air two days before the landing at Rabaul. The 2/1st Independent Company put up resistance, and had some casualties. The surgical work was carried out at the civil hospital by Bristow with the assistance of Sister D. M. May, and the severely wounded were taken to the mission under her care. Numbers of men were suffering from malaria and dysentery. At 3 a.m. on 23rd January the Japanese landed, and demolitions were carried out. Two of the wounded died, but the remainder eventually reached the main camp at Rabaul on 1st May, when it came under control of the Japanese navy. The survivors made their way to Kaut Harbour; one man was carried part of the way, but finally all walked to Kaut and embarked in the damaged *Induna Star*. On the morning of 31st January the schooner reached Kalili, 100 miles from Rabaul, and was bombed; four men were killed and thirty-five wounded. During the afternoon a destroyer intercepted the schooner, and took the wounded and the officers on board and treated them well. The *Induna Star* was placed under guard till next morning, when the destroyer took the remainder to Rabaul, leaving ten men to bring the schooner to Rabaul.

THE SOUTH COAST PARTY

When the retiring troops turned towards the centre of Gazelle Peninsula a considerable body of men took the route to the south coast, passing through the inland part of the area south of Vunakanau aerodrome. Some followed a route through Rabata, crossing the Warangoi and Kavavas Rivers, and proceeded by a rough native trail to Adler Bay, some fifty miles south of Rabaul. Others went from Wairiki crossing the Warangoi River nearer the coast, and reached Put Put Harbour and thence followed the coast down to Adler Bay. From there the surviving members of

these parties continued along the east coast of the Gazelle Peninsula to Wide Bay. Small parties successfully crossed to Finschhafen and thence reached Wau, were taken to Moresby and at last were flown to Townsville on the mainland. Others after great hardships reached a point where arrangements had been made for them to be picked up by a vessel. Some 150 soldiers and civilians were thus embarked to Moresby on 9th March, and a smaller party made safe passage in a launch.

About 300 men began a hazardous trip over the mountains, some 3,500 feet high, and were accompanied by the medical party from the field ambulance, which had a haversack of dressings and a pack containing drugs. At the beginning of this trail all wheeled transport had to be abandoned. Treatment of the sick was carried out during the halts, but the party was strung out along the way, and there were only limited facilities for medical work. In the early stages of the march one man had to be left with a fracture; he was attended by Captain Robertson at Malabunga, and left in the care of orderlies. Later they restored an ambulance vehicle to service, and returned through the Japanese lines without hindrance to Vunapope hospital. Quinine was conserved by Major Palmer, and any that was carried by the men was not used for prophylaxis lest there be none left for treatment. Within two days' march from Wide Bay Major Owen, commanding "A" Company of the 2/22nd Battalion asked Palmer to come forward to overtake the leading troops so as to organise a camp by the sea as a possible rescue base. Robertson was left in charge of the medical party.

Unfortunately, the day after the troops arrived at Wide Bay, a large party of Japanese arrived in landing craft and captured over 130 Australians. Most of these they massacred by rifle or bayonets, after tying their hands; the victims included most of the field ambulance detachment, despite the brassards on their arms. Captain Robertson was taken back to Rabaul as a prisoner.

The remainder of the party, being dispersed through very rugged country, only learnt of what happened from several wounded who were brought to Palmer some days later. The injured men had gunshot or bayonet wounds in the upper part of the body, and were able to walk with the party as it made its way down the coast, provided they started well before the main body set out each day. Deaths were now occurring from malaria, and when Palmer caught up with some 200 men on the coast he learnt that a number had already died. Three weeks later they found at a mission station that the Japanese were established at Gasmata, and the escaped men therefore settled in two camps with a reasonable supply of food in native gardens in abandoned plantations ten miles apart. A hospital was set up in one plantation, and some forty sick men were kept there. These men and the hundred or so in the other camp all had contracted malaria during the march, and Palmer soon found so many men ill in both camps that he spent his time going back and forwards between them.

At first Palmer aimed at giving 50 grains of quinine daily for four days to all men with acute malaria, in the hope of limiting recurrences, but it was soon obvious that this could not be done. Infections were of severe type, and as only an early rescue could ensure that supplies of quinine would last, he decided to give only the minimum of the drug, so as to save men from threatening danger of death. He found, however, that 5 grains of quinine twice daily for three days would give seven to ten days of freedom from attacks. In the last three weeks many men were desperately ill, one-third of them had daily rigors, and secondary anaemia, with oedema of the feet and dyspnoea was common.

Dysentery was prevalent as satisfactory camp sanitation and water sterilisation were difficult to attain. Tinea and tropical ulcers were common, and malnutrition, due to insufficient protein in a largely native diet was inevitable: loss of weight was universal and considerable. The morale of the men was highest in those who were occupied on behalf of others, but the depression of life in the jungle with little apparent hope of rescue weighed upon them heavily. Though the physical condition of the men was poor they were able to make a forced march, carrying those unable to walk, in order to pick up sea transport to Moresby which at last had become a reality. While waiting for the ketch every man was given 5 grains of quinine twice daily. From Moresby the survivors were taken back to the mainland, where it was later estimated that out of 252 men 50 had died with malignant malaria. Lieut-Colonel Carr with a small body of men managed to make contact with the party on the north coast by following the shore to Cape Oxford, and across the neck of the peninsula from Wide Bay. Eventually they heard of a boat in hiding at Ioboki and reached Cairns on 28th March. Another party reached the north coast of New Guinea and eventually arrived at Moresby.

Major Akeroyd, Captains Robertson and Bristow and other members of the A.A.M.C. were kept in the prisoner-of-war camp at Rabaul for a time. Captain Silverman was brought in on 26th January, before any other medical personnel, but owing to his having left hospital when not in uniform he wore no brassard. Although identified to the Japanese by an officer who was a prisoner of war he was taken away, allegedly to a camp, but was never heard of again, and was reported as dead by the Japanese.

The civilian clergy and medical men, Doctors Hosking, Cooper and Hay were sent away separately with the troops and other civilians, and embarked on the *Montevideo Maru* on 22nd June. Unfortunately this ship was sunk by an American submarine off Luzon, Philippine Islands, on 1st July while on the way to Japan, and there were no survivors.

Fifty army officers, seventeen nurses and other women, including six army nurses in charge of Sister Parker embarked on the *Naruto Maru* on 5th July. The conditions on the ships were not bad. The officers travelled in a hold lined with clean timber, and were well treated; there was a scanty but regular supply of water for washing and bathing, and the food was adequate. The ship arrived safely in Japan; the officers

landed at Yokohama, and thence went to an officers' camp at Zentsuji. The conditions here were reasonable, food and clothing and Red Cross supplies were issued regularly, and the administration was much more favourable than in the prisoner-of-war camps in mining towns, ship building and dock yards and centres of heavy industry.

The casualties sustained by the forces in New Britain and New Ireland were proportionately heavy, but without the aid of local civilians and natives and the assistance of signals to and from Moresby the losses would have been even greater. Out of about 1,700 troops in New Britain including troops in New Ireland and N.G.V.R. the total battle casualties were 70 officers and 1,121 O.Rs. Of these there were 69 officers and 1,046 O.Rs. prisoners of war; an estimate made by the diarist of the 2/22nd Infantry Battalion placed the number of servicemen who escaped at about 400; in addition to these, some 60 civilians, 4 members of the R.A.N. also escaped, and 120 members of the R.A.A.F. were flown to the mainland while there was still opportunity. On the southern escape route about 140 men were massacred by the Japanese, and about 60 others died or were believed killed. The greater number of the prisoners of war lost their lives, for 970 servicemen and about 160 civilians were lost when the *Montevideo Maru* was sunk on 1st July. This number includes 135 men from the 2/1st Independent Company in Kavieng. Sixty-five officer prisoners of war were later recovered from Japan.

PORT MORESBY

Australia's personal interest in New Guinea and Papua since the 1914-1918 war made it imperative that a garrison force should be maintained there when hostilities broke out in 1939. At this date affairs were in the hands of the Civil Administration, but military control became inevitable. When the Japanese attack on the Far East and the South-West Pacific Area began Australian defensive forces were in Moresby and Rabaul, and the 2/1st Independent Company in Kavieng in New Ireland. In Kavieng a medical officer had control of a six-bed hospital, and used orderlies to provide for sections at Manus, Tulagi and Buka Passage. In Port Moresby in early February 1942 the defence force comprised troops of the 30th Brigade of the militia. For the present no more will be said about Moresby: circumstances of war made it the most important military centre in New Guinea, but its story even from 1940 belongs to the history of the Pacific war. Port Moresby saw the beginnings of successful actions which radiated out to link with others throughout the South-West Pacific Area; these are dealt with in Volume III.

MEDICAL ASPECTS OF INDEPENDENT COMPANIES

Independent companies were sent to Nauru and New Caledonia, which had valuable experiences, though under peaceful conditions unlike those of the companies such as those on Timor and Ambon. These companies have to be self-contained, their medical supplies must be compact and yet sufficient, and their medical officers must be prepared to deal with many

problems of hygiene and medical and surgical treatment on their own initiative.

Notes referring to Timor are included in the section dealing with "Sparrow" Force.

NEW CALEDONIA

At the end of 1941 the 2/3rd Independent Company arrived in New Caledonia, and the medical officer Captain T. B. Patrick took over from the medical officer of a force known as "Robin" Force, which had been sent earlier to Noumea. The operation of the company involved the splitting of the unit into fourteen different sections dispersed over an area of about 5,000 square miles. Road communication was poor, and it was therefore necessary to set up a hospital in a central place where work could be carried out without dependence on the French. The only A.A.M.C. personnel attached to the company were one medical officer, two sergeants, and five corporals. Four N.C.Os. were placed each in an area reasonably central for access to the camps under his surveillance. French physicians in some of the areas could help by consultation, but in the end most patients needing care came into hospital. Each N.C.O. was instructed to move about among his set of camps, but the hazards of transport made this difficult of fulfilment. A good quantity of medical supplies was given to each N.C.O. and a central reserve was split up into three parts, kept at strategic points in the hilly centre of the island which could only easily be reached on horseback. Captain Patrick and Flight Lieutenant Sevier of the R.A.A.F. collaborated in these arrangements.

In March 1942 an American force arrived and placed detachments in the areas occupied by the Australians. Until April all medical care was carried out by the American Medical Corps, and Patrick was attached to the surgeon's office in Noumea as an adviser.

Early in May the company was moved into another area and once more split up into fourteen sections; though the nearest American hospital was only twenty miles away this was five hours' journey and Patrick again set up his own hospital. Thirteen men were invalided home, two with chronic dysentery, two with accidental gunshot wounds and the rest with pre-enlistment disabilities. It was noticeable that dental and ophthalmic attention were much in demand by the men. Nearly 30 per cent of the force needed dentures and another 40 per cent other dental attention. Most of the 101 hospital admissions were for minor complaints.

These observations emphasise the need for very thorough examination of men for independent companies. In particular age was important: men over 35 years were a constant source of worry to the medical officer, and it would seem wise to make this the upper limit acceptable. This also applies to men with special qualifications. Eye disabilities were found even in men accepted for signals work. More important was the need for instruction of every man in hygiene and in first aid: this was particularly necessary with junior officers. Training in hygiene, as Captain Patrick pointed out, cannot be done properly in a set camp with ready-made

facilities: field training is imperative. He aptly remarked that some independent companies had been trained as though they were "a band of Robin Hoods or Ned Kellys". Where preventable disease is endemic in a country the correct measures must be applied by all the men if they are to survive as a unit.

Endemic diseases in New Caledonia were leprosy, tuberculosis and syphilis, mainly among the native population, and dysentery. Investigation by the Americans failed to demonstrate any amoebae in 125 patients examined, though hepatic abscesses occur in Noumea. Though amoebic infection is said to be common in the island it seems certain that bacillary types frequently occur. Ankylostomiasis is common among the natives and dengue was described, though no cases were seen in the Australian force. Contact with the sap of a tree was observed to cause a severe vesiculated rash with intense general oedema of the region. The analogy with at least one tree in North Queensland may be drawn. No malaria was seen, and there were no anopheline mosquitoes on the island.

Patrick made special reference in his report to the need for revision of the medical equipment of these companies, to ensure that it contained all real requirements, but nothing else, and was so packed as to facilitate carriage.

NAURU

The German raider *Komet* shelled Nauru in December 1940, and early in 1941 "Wren" Force or "W" Force was sent to Nauru, one of the important islands of the Pacific on account of its phosphate deposits. There was a Government medical officer on the island, Dr B. Quin, who was well equipped for all ordinary medical, surgical, radiological and pathological work. The R.M.O. of the force was Captain A. M. Barron, A.I.F. It is of historical interest to recall that one of the early medical officers on Nauru was the late Dr George Bray, an Australian graduate who made observations on the importance of vitamin B1 in nursing mothers among the natives, and drew attention to the lack of this vitamin as a cause of infant mortality.

The A.I.F. camp was well laid out west of Buada Lagoon 300 yards from action stations and about a mile and a quarter from the European settlement. All the essential services were satisfactory, and refrigeration was provided. Accommodation was in huts in this permanent camp, some of native design, with concrete floors and thatched roof, others of fibrolite and galvanised iron. The climate was humid and the rainfall high. The camp was sheltered from the strong prevailing westerly wind, and the ground was mainly composed of coral and phosphate which absorbed water quickly.

Training of all men in first aid proceeded regularly. The health of the men remained good on the whole, the most common ailment was infected abrasions. Food was satisfactory as a rule, but vegetables arriving from the mainland were not always fit for consumption owing to mould, which was also troublesome on the island. One condition appeared, *otitis externa*, which troubled a number of men, and for which ichthyol in glycerine was

found most effective. As it seemed to be connected with the use of showers, which were freely indulged in owing to the heat, an investigation was carried out by Captain Barron. The water used for showers and latrines was separate from that used for other purposes. Fresh water was used for drinking and cooking, and "moqua" water, derived from phosphate caves for showers. Gram-negative bacilli were found on microscopic examination, and Dr Quin found that paratyphoid bacilli were present. The water was sent to the mainland for further examination, but as there was strong reason for believing it was contaminated, wool plugs were ordered to be used before showering, and the water was chlorinated twice daily in the tank to which it was pumped. No fresh cases of otitis occurred.

Ocean Island and Nauru were both bombed by the enemy; Ocean Island on 8th and 9th December 1941 and Nauru on 9th, 10th and 11th December 1941. The forces on Nauru and Ocean Island began demolitions of jetties and buoys, and of some of the loading plant. Further demolition of equipment was carried out in January 1942, and towards the close of February a French destroyer took off the garrisons from these islands. Members of the civilian administrative staff were taken prisoner by the Japanese, who landed there later, and were killed by them in March 1943. The Japanese also placed the inmates of the leper station in a boat which was towed out to sea. The fate of these unfortunates remained unknown; it was reported that the boat was sunk by gun-fire, certainly it was never heard of again.

These disconnected accounts of small forces sent to various islands for defensive purposes, and in some instances to harass an enemy established there, show how operations in a tropical zone often entail work in a difficult terrain and a trying climate, beset with endemic disease, against which a medical service strives with difficulty but not without result. Past some of these areas of frustrate military endeavour sailed the I Australian Corps with two divisions, unable now to help their stricken fellows in Malaya, and with unknown tasks in the South-West Pacific Area before them. It now remains for us to follow the 8th Australian Division from its early jungle training to the capitulation of Singapore, and after.

CHAPTER 23

MALAYAN CAMPAIGN

THOSE areas of the Far East running east from Malaya through the Indies to the South-West Pacific were recognised to be of prime importance in the defence of Australia. After a defence conference at Singapore and discussions held with the British authorities, the Australian War Cabinet decided to send forces to certain strategic points in the Far East. Of these the most significant was Malaya.

Accordingly in January 1941, part of the recently raised 8th Division of the A.I.F. was assigned to Malaya. A force of 6,000 known as "Elbow" Force, with thinly veiled security, left Sydney by the *Queen Mary* on 4th February 1941. Immediately after this preliminary move the War Cabinet decided to move one A.I.F. pioneer battalion, and one A.I.F. infantry brigade less one battalion to the Darwin-Alice Springs area. We have previously seen that this provided for a brigade group at Darwin and small forces for Timor and Ambon. It was also decided to call up the remainder of a militia battalion for Port Moresby and Thursday Island, and to send an A.I.F. battalion to Rabaul. Thus early in 1941 Australia had a slender chain of military forces from Singapore to New Britain.

In sending troops to Malaya the War Cabinet pursued the policy of not submerging the individuality of expeditionary forces in British commands. Therefore the party proceeding overseas to Malaya had the nucleus of a divisional headquarters under command of Major-General Gordon Bennett, though for the time being the force comprised little more than a brigade. The medical units of the force included the 2/9th Field Ambulance, the 2/4th Casualty Clearing Station, a transport section of the 2/2nd Motor Ambulance Convoy without a medical wing, the 2/10th General Hospital, the 2/2nd Mobile Bacteriological Laboratory, the 17th Dental Unit, the 2/5th Field Hygiene Section and a detachment of an advanced depot medical stores. Major J. G. Glyn White, D.A.D.M.S. of the 8th Australian Division, A.I.F., deputy to Colonel A. P. Derham, who was A.D.M.S. of the Division, became D.A.D.M.S. of A.I.F. in Malaya.

The headquarters divisional staff preceded the main body of troops, which arrived in Malaya on 18th February. The divisional headquarters and attached units were placed at Kuala Lumpur, the 2/9th Field Ambulance was with the brigade in the Seremban-Port Dickson coastal area, the casualty clearing station and motor ambulance convoy were stationed at Kajang fifteen miles to the south, and the 2/10th Australian General Hospital was sited at Malacca. The 2/3rd Motor Ambulance Convoy was recruited in Australia for the Malaya Command Medical Service but was trained and administered by the A.I.F. The transport wing arrived first and was trained under the command of the 2/4th Casualty Clearing Station. The medical wing arrived later with the com-

mander, Major Robert Dick. The 2/3rd Advanced Depot Medical Stores arrived in April 1941 under Captain A. W. Rogers, and was at first attached to the 2/10th A.G.H. at Malacca.

Additional medical units arrived later in the year. The 2/2nd Convalescent Depot and 2/3rd Motor Ambulance Convoy arrived on 24th April, the medical wing of the 2/2nd M.A.C. in June. Colonel Derham arrived by air from Sydney early in April. Friendly relations were established with Brigadier C. H. Stringer, in charge of medical arrangements for Malaya Force, and full mutual cooperation was maintained between the British and Australian medical services. On 15th August the 2/10th Australian Field Ambulance reached Singapore, and on 15th September the 2/13th A.G.H. arrived in response to a request cabled to the headquarters in Australia for another general hospital. By this time the 27th Brigade had also arrived, and the 8th Division was constituted with two brigades and other troops. The siting of the Australian medical units did not follow a definite strategic pattern, partly because the 8th Division was being held in reserve for the time being, without a definite individual role, and partly because of the advantage of using areas free of malaria.

THE COUNTRY

Derham had prepared in advance notes on Malaya, and also an appreciation of the situation during the period of training which the A.I.F. now entered. These notes gave details of the Federated and Unfederated Malay States, with their large population, chiefly Malays and Chinese. The country in which the Australians seemed likely to be committed to military action presented a great contrast with its highly developed and civilised areas and its dominating jungle. Singapore Island, linked with the mainland by the narrow Johore Causeway, which carried its traffic as well as most of its water supply, gave little idea of the dense jungle which covers a great proportion of the peninsula. An important feature of the terrain of the peninsula was the mountain range which runs up its centre, falling away on each side to coastal plains, with many swamps on the western aspect. Large rubber plantations flourished in extensive areas of the dense jungle growth, reached by good roads and there was rail communication with the more important centres; elsewhere there were only primitive paths and tracks. Rivers and their tributaries fed by the tropical downpours of rain threaded the fantastically rich vegetation and provided another ready means of travel.

The climate was constantly hot and humid, with a monotony enhanced by its discouragement of all needless exertion and its lack of seasonal variety. The difficulties of military operations and even of training were great in such surroundings, where the climatic discomforts of heat and heavy rainfall interfered with rest.

Prevailing diseases were malaria, dysentery, hookworm, and in addition, among natives, leprosy and the common infectious epidemics. Mite-borne typhus occurred but was not common. Malaria was well controlled in the settled areas, where mosquito control had been energetically applied,

and this and other local diseases had been the subjects of vigorous research in Malaya by workers of international repute. Here, as in other parts of the world where battles were fought in highly malarious areas, constant struggling was necessary to maintain high standards of malaria control once troops passed from places already made safe to others where the risk of infection was great.

ORGANISATION

The A.I.F. headquarters was built up to the full strength required by a complete division, and by the middle of August, on the arrival of the 27th Brigade Group the organisation was adequate for the control of the A.I.F. in Malaya. Colonel Derham acted both as A.D.M.S. 8th Division and A.D.M.S., A.I.F. Malaya. It was realised that in the event of action the divisional medical staff would have a sufficiently absorbing task in handling the units in the field; therefore an administrative medical headquarters was formed to control the base organisation. Lieut-Colonel Glyn White became D.A.D.M.S. administrative headquarters, A.I.F., and Major Bruce H. Anderson was appointed D.A.D.M.S. on the divisional staff on 14th September 1941. By this time the strategic role of the A.I.F. in Malaya was altered, largely through the urging of Bennett for a definite territorial responsibility for the division. Therefore on 29th August the 8th Australian Division was assigned the duty of defending an area which included Johore and Malacca. Following this change more purposive training was undertaken based on the areas in the northern part of Johore. In other respects the medical units carried out their usual functions. The field ambulances worked each with a brigade.

The 22nd Australian Infantry Brigade took up positions at Mersing, a settlement on the east coast of Johore. Mersing was considered a crucial point in a possible attack from the sea, and here the brigade dug in and spent several months in preparing for possible attack. The attached field ambulance, the 2/9th, under Lieut-Colonel Hedley Summons, constructed an advanced dressing station capable of accommodating 600 stretcher patients for a week or more in blast-proof shelters. A blast-proof dressing post and operating room were also provided for safe working during action. This work, including the provision of a good road of access, was carried out by the staff of the unit under technical supervision.

By the end of the year the 2/10th Field Ambulance under command of Lieut-Colonel E. MacA. Sheppard was settled at Kahang, and there was busily engaged in digging in a main dressing station and slit trenches. An orderly room, dressing room, ward and room for a surgical team were prepared in tents with walls buttressed with timber and galvanised iron.

The 2/4th Casualty Clearing Station commanded by Lieut-Colonel T. Hamilton had been doing routine work at Kajang, and in addition housed a section for venereal diseases staffed by the 2/10th A.G.H. In September the unit moved to Johore Bahru, where it acted as a small hospital with 150 to 200 beds. The arrival of the 2/13th Australian General Hospital freed the casualty clearing station, which in November moved



Australians train for jungle warfare Malaya.

(Sydney Morning Herald)



Attending wounded in action in Malaya.

(Sydney Morning Herald)

to Kluang. This site was chosen largely on the advice of Brigadier Stringer, D.D.M.S. Malaya Command.

When the A.I.F. dispositions covered the defence of Johore the original battle plan placed the C.C.S. at Segamat, largely because this was a malaria-controlled area. The D.D.M.S. however, pointed out that the assumption that an advancing enemy might come from the east was not necessarily justified, and a casualty clearing station at Kluang could receive casualties from all quarters as the map shows. This decision proved wise as casualties could be brought from Segamat, Mersing, Muar and Batu Pahat, and could be sent on to the 2/13th A.G.H. at Johore Bahru by road or rail. The 2/13th A.G.H. after its establishment expanded its capacity to 1,200.

The 2/10th A.G.H. originally equipped for 400 beds had expanded to 600 soon after its establishment in Malacca. It was sited in excellent buildings which formed part of the civil hospital in Malacca, where full facilities for all medical and surgical work were available. Major Maynard was able to carry out routine pathological work in the state laboratories, and the mobile bacteriological laboratory under Major Burnside in addition to diagnostic routines paid special attention to malarial diagnosis and the investigation of dysentery. Amoebiasis, known to be endemic, received careful attention. Though this hospital was sited on the coast sea transport of the sick was not practicable, since the port did not permit ocean going ships to approach within several miles of the shore. However, good road transport was available.

The 2/13th Australian General Hospital was raised somewhat hurriedly in Australia, but had the advantage of having its senior officers appointed from other units already in Malaya. Colonel D. C. Pigdon came from the 2/2nd Convalescent Depot to take command. Lieut-Colonels C. H. Osborn, senior surgeon, and W. A. Bye, senior physician, came from the 2/10th A.G.H., and Matron Drummond came from the 2/4th C.C.S. First assembled at St. Patrick's School, the unit dispersed some of its staff to the Singapore General Hospital, to the 2/10th A.G.H. and to other service units for local experience, and on 21st-23rd November took over a site at Tampoi, seven miles from Johore Bahru, in an unfinished mental hospital. By 8th December, 1,183 beds were equipped, and a new loop road was completed by staff and work gangs of hospital inmates. The installation of theatre equipment such as a shadowless lamp was also done by the staff of the hospital. The Sultan of Johore visited the hospital and gave for its use a portable X-ray and a diathermy apparatus. In January arrangements were made for the carrying out of facio-maxillary surgery in the hospital under direction of Lieut-Colonel Osborn: it was proposed that this should act as a centre for this work on British, Australian and Indian soldiers.

The 2/2nd Convalescent Depot was first established at the end of April by Lieut-Colonel Pigdon, at Tanjong Bruas, and, although the unit started without previous experience in this type of work, a sound foundation was laid at Tanjong Bruas, accommodation was provided for 600

men, with facilities for recreational and occupational activities. On the transfer of Pigdon to command the 2/13th A.G.H. Lieut-Colonel R. M. W. Webster took over command. For general convenience patients were received from a wide area, not solely from general hospitals. Men were classified according to condition and reclassified weekly, and as much training was given as climatic conditions permitted. On 29th December 1941 the unit was moved to Batu Pahat on the west coast of Johore. Great assistance was given by the Australian Red Cross Society in providing and equipping reading and writing rooms for patients, and in supplying material for games and recreation.

Derham in a special report to General Maguire, D.G.M.S. in July 1941, pointed out that the sick wastage rate for the A.I.F. troops in Malaya was excessive, though his own original estimate was even higher. The daily average varied from 5.9 per 1,000 soon after disembarkation to 2.0 a little later, and was eventually stabilised at 3.5 per 1,000. Comparisons of figures with hospital admissions of British and Indian troops were fallacious, as certain types of cases such as skin conditions were often treated at the aid posts. Bennett made special representations to Australia to ensure that a high standard of fitness of recruits was maintained. Major-General Downes, I.G.M.S., visited Malaya in September 1941 and found the state of general health and of medical training satisfactory. He was specially interested in the provision of stretchers suitable for jungle operations.

MEDICAL CONDITIONS

Among the Australians skin lesions caused a high proportion of the sick wastage, though few men with these troubles were returned to Australia. Downes, during his official visit promised to ask for an experienced dermatologist to be sent to Malaya from Australia.

The skin conditions troublesome in Malaya were those related to anomalies of sweat secretion and to infections. *Miliaria rubra*, or prickly heat, which later aroused interest in other tropical areas, was rife, and caused much discomfort. Control of sweating and simple applications such as talc powder gave some relief. Septic abrasions and ulcers seen in other tropical theatres were also common; as in the Middle East prompt treatment was found valuable such as epilation with an occlusive dressing or an anti-bacterial preparation such as sulphanilamide. Fungus infections also appeared, though the diagnosis was often not confirmed, and strong fungicides when incautiously used were found to prolong the condition, which in reality was very often due to bacterial invasion. *Otitis externa*, known in Malaya as "Singapore ear" was a painful and troublesome lesion. The prohibition of swimming in places where the incidence was high did little to prevent it, and ear plugs were not found of value. Spirit boric drops were found of some prophylactic value, so too was the avoidance of introduction of match sticks or similar swabbing devices into the canal.

Malaria was well controlled on Singapore Island up to the time of capitulation, but outside the controlled areas in Malaya the chances of

infection were great. Malaria prevention did not play a significant part during the later operations, as the procedures were not an integral part of the military life, but quinine was at first, at least, adopted as a suppressive drug in situations where it was indicated.

Medical examination of men returned as unfit to Australia revealed that a high percentage had disabilities at the time of enlistment which would have been disclosed by a more accurate or true statement by the recruit or by more searching examination. There was no doubt that age was sometimes incorrectly stated, and these older men did not always stand up to strain.

Some confusion arose in the matter of medical supplies. For the first three months the A.I.F. in Malaya was very short of medical supplies. This was due chiefly to a belief in Malaya Command that Australia would supply all medical stores and replacements in Malaya. The A.I.F. units presented indents to Command Medical Stores, but these were not filled. Personal approach to the D.D.M.S. Malaya Command immediately rectified the situation, but it appeared that difficulty would arise in ensuring full supply of all Australian medical requirements in Malaya by the British without at least some supplies being sent from Australia. It will be noted that a similar position on a larger scale occurred in the Middle East.

DISPOSITIONS IN MALAYA

Towards the end of 1941 there was conscious increase in international tension.

Lieut-General A. E. Percival, the army commander, had received reinforcements to the Malayan garrison since he had taken over the command in 1941, though these were much below the agreed requirements. In 1937 he had made recommendations concerning the defence of Malaya which had been accepted in principle by the Chiefs of General Staff. At the close of 1940 in addition to the Singapore garrison troops two British battalions were transferred from Shanghai, and during 1941 reinforcements arrived from India and Australia. The III Indian Corps under Lieut-General Sir Lewis Heath included incomplete 9th and 11th Indian Divisions, and there were also two additional British field regiments, and an anti-tank regiment, and an Indian field company and Indian mechanised cavalry. The Australian 8th Division lacked a third brigade but was otherwise complete. However the army strength fell far short of agreed requirements; there were no tanks or armoured cars, and there was a shortage of anti-tank rifles and mobile anti-aircraft guns. No more field forces could be supplied from the United Kingdom. The position in the air was even worse, instead of an estimated 582 aircraft there were 158 obsolescent types, inadequate for attack on sea-borne invaders. The Indian corps was responsible for defence north of Johore and Malacca, the A.I.F. for the defence of Johore and the fortress troops for Singapore Island.

The A.I.F. medical units were disposed as follows:

Divisional Units.

2/9th Australian Field Ambulance (Lieut-Colonel H. F. Summons) H.Q., M.D.S. at Kota Tinggi, "A" Company in reserve, "B" Company at Mersing.

2/5th Australian Field Hygiene Section (Captain R. W. Greville) attached to the M.D.S.

2/10th Australian Field Ambulance (Lieut-Colonel E. MacA. Sheppard) in reserve with 27th Infantry Brigade at Jasin II Camp Malacca, Segamat Road.

Non-Divisional Units.

2/4th Australian C.C.S. (Lieut-Colonel T. Hamilton) Kluang area; in temporary site in civil hospital Kluang, detachments at Segamat with 2/29th Battalion (Major W. E. Fisher, S.M.O. of area of H.Q. 27th Brigade) and at Batu Pahat (Major S. Krantz) 2/30th Battalion.

2/2nd Australian M.A.C. (Lieutenant Robertson) H.Q. at 2/13th A.G.H. Tampoi Hill, Johore Bahru.

2/3rd Australian M.A.C. (Major R. Dick) attached 2/10th Australian Field Ambulance.

2/2nd Australian Mobile Bacteriological Laboratory (Major K. Burnside) attached to M.D.S. 2/9th Field Ambulance serving 22nd Infantry Brigade.

2/10th A.G.H. (C.O. Colonel E. R. White) Civil General Hospital Malacca. (Physician, Lieut-Colonel W. Cotter Harvey, Surgeon, Lieut-Colonel A. E. Coates).

2/13th A.G.H. (C.O. Colonel D. C. Pigdon) Tampoi (Johore Bahru) (Physician, Lieut-Colonel W. A. Bye, Surgeon, Lieut-Colonel C. H. Osborn), detachments running camp hospitals.

2/2nd Australian Convalescent Depot (Lieut-Colonel R. M. Webster) Tanjong Bruas 8 miles north of Malacca on coast.

2/3rd Advanced Medical Stores (Captain A. W. Rogers) Johore Bahru.

On 6th December a warning was given to A.I.F. troops to begin movement to deployment areas. Arrangements had been made for rapid extension of malaria control of areas to be occupied by troops in the event of hostilities. The regular administration of suppressive quinine was at once begun in deployment areas in a dose of 8 grains daily. An experience showed that difficulties might arise with signals, as duplication of vital messages through alternative channels was not readily practicable. Detachments of the C.C.S. were at once recalled, and the 2/10th Field Ambulance moved from reserve with the 27th Brigade to establish an M.D.S. a mile and a half from Kluang on the Rengam road and an A.D.S. at Kahang. With the C.C.S. working at Kluang the 2/10th Field Ambulance moved its M.D.S. to Kahang. While the M.D.S. of the 2/10th Ambulance was at Kahang an underground dressing station was conducted with a blast-proof operating theatre for the use of the mobile surgical team from the 2/4th C.C.S. comprising Major S. Krantz and Captain T.

Brereton and six other ranks. Arrangements were made for mobile surgical teams to be detached from the C.C.S. and the general hospitals, complete with transport, staff and equipment, but only the C.C.S. team was used. Rickshaws were obtained and converted by the unit into mobile stretchers for use in quick transport of wounded from the 2/29th Battalion at the Kahang aerodrome should that have been necessary. At this time the unit also had an A.D.S. stationed near the Jemaluang cross-roads ("B" Company) and a small medical establishment at a Japanese tin mine near Endau. They planned to evacuate wounded down the Kahang River, boats and engines being obtained for that purpose.

The reality of danger of air attacks on the Kluang aerodrome induced Hamilton to seek a better site for the 2/4th C.C.S. This was found at the Mengkibol Estate and approved by Colonel Derham. On 8th December tents and marquees were erected in rubber plantations, and within a few days cement floors were supplied for operating and X-ray marquees, and water was piped from wells. Brassards were now worn under order from headquarters. Several days after the transfer the old site was bombed. The 2/10th A.G.H. had been taking patients with less urgent conditions from the C.C.S. and the 2/13th A.G.H., but these transfers were now stopped, and movement of such patients was now to the 2/13th A.G.H., since the 2/10th Hospital was in a potentially more forward area. A medical evacuation plan was made for the Australian forces. The 2/9th Field Ambulance served the 22nd Infantry Brigade and arranged to collect casualties from the 2/20th and 2/18th Battalions and the 2/10th Field Regiment at A.D.Ss. in the perimeter, and move them by ambulance to the M.D.S. on the Kota Tinggi road, where accommodation was ready for 100 cases, readily expanding to 200 or 300 if necessary. Thence the 2/2nd M.A.C. could take them to the 2/13th A.G.H. at Tampoi. Casualties from Sidili boom could be moved by Red Cross launch to a point where an ambulance car was available.

The 27th Brigade casualties from the 2/30th and the 2/19th Battalions and the advanced headquarters and artillery battery were to be moved to the M.D.S. of Sheppard's 2/10th Field Ambulance at Kahang and those from 2/29th Battalion which was guarding the Kluang aerodrome were taken direct to the 2/4th C.C.S. at Kluang. Thus the C.C.S. acted as a medical centre for any detachments in the Kluang area. The Indian 5th C.C.S. was on Singapore Island and only functioning in part as a field ambulance. The 2/3rd M.A.C. moved patients farther on to the 2/10th or 2/13th A.G.H.; the distances were considerable and the roads difficult. Instructions conforming with a "battle plan" had been circulated to all units, and on receipt of the code word "Raffles", battle stations were taken up in accordance with this plan.

ACTION IN NORTH MALAYA

The expected blow from Japan fell with unexpected suddenness with the raiding of Pearl Harbour on 7th December. At the same time Japanese planes bombed Kota Bharu, Singgora and Patani. Enemy raiders were

detected thirty-five miles north east of Mersing but through bad liaison warning was not given to Singapore, which presented an illuminated target for a raid in which there were sixty people killed. Warning for movement had been given to the 11th Indian Division in accordance with the plan known as "Matador", which was designed to prevent and intercept enemy landings in Singgora. There were politico-military implications in a plan involving the entry of Thailand, but when movement was made it was too late for the plan to be fully implemented. The Japanese had a large convoy of transports off the east coast, and made landings at Singgora and later at Kota Bharu. The Indian troops encountered unexpected resistance from the Thais, and were unable to reach a position known as the "ledge", inside the Thailand border.

Meanwhile the Japanese bombed airfields on the west coast of Malaya, at Alor Star and Sungei Patani, and by 10th December Japanese ground troops had swiftly advanced and inflicted heavy casualties on the British and Indian troops. The Japanese advance now assumed the form of a three-pronged drive, pressing south along the east coast from Kota Bharu, advancing down the centre of the peninsula, and pouring towards the west coast where they engaged the forces defending Jitra. It was soon evident that the greatest danger was on the west coast in North Kedah. The Indian field ambulances which had been held in readiness for the advance into Thailand were evacuating casualties to the 5th Indian C.C.S. at Bedong, and on the central front where "Krohcol" was operating, the 2/3rd Australian M.A.C. under Major Dick was assisting in transport of wounded, although no Australians were at that time in action. Practically all the transport of wounded both in front of and behind the field ambulances was done by this unit.

On 10th December the battleships *Prince of Wales* and *Repulse*, which had recently arrived, while seeking an invasion flotilla off Kuantan on the east coast of the peninsula, were attacked and sunk by Japanese torpedo bombers. This tragic loss emphasised the lack of air cover and the risk of further enemy landings.

In Kedah the 11th Indian Division, with the Leicesters and East Surreys, was holding the Jitra line, a rather weak position across the main road. The hope that the Japanese could not bring tanks over the bridges in the north proved illusory, and they repaired all damage with surprising speed. By the 11th the Japanese force had reached the Jitra position, and next day heavy attacks forced the defenders back with many casualties.

After raids on the northern airfields Penang was heavily bombed on the 12th and 13th; there were several thousand casualties, mainly among civilians. The outflanking move of the Japanese on the central front necessitated further withdrawals from Kroh, leaving the way open to Ipoh farther south, despite strong resistance from the Argyll and Sutherland Highlanders. On the 16th and 17th Penang was evacuated, but without the destruction of installations important to the enemy. The airfields at Kota Bharu had also been lost after very heavy fighting on 10th December and Heath instructed the force there to withdraw, a movement which

was completed by the 21st. At this stage the invasion front was a little more than 400 miles from the Straits of Johore.

The British and Indian forces of the central and western columns withdrew behind the Perak River on the 22nd. A special independent company "Rose" Force including some members of the Royal Marines and A.I.F., launched attacks to the west of the river on the 24th and 25th. On the 28th December there was still fighting on the Perak River, but the Japanese, by outflanking tactics against the III Indian Corps, were advancing on the Slim River.

At the end of December Major Anderson, D.A.D.M.S. 8th Australian Division, carried out a reconnaissance of a number of areas of importance in the evacuation of wounded. These included Kluang, Yong Peng, Muar, Malacca, Gemas, Segamat and Batu Pahat. His report was timely, as it also shed light on general problems of defence and supply on the Muar-Segamat sector.

On 1st January the Japanese forces landed on the west coast at the mouths of the Perak and Bernam Rivers and attacked Kuantan on the east coast. After four days' fighting the 22nd Indian Brigade of the 9th Indian Division which was protecting the airfield at Kuantan withdrew. The defensive position was now on 4th January centred on the Slim River. Some of the Indian medical units were moved back; the 5th Indian C.C.S. went back to Kajang. The position was very serious. Great civil confusion prevailed at and after the fall of Penang; roads were crowded with civilians hurrying south, and with troops bound for the battle areas. Military retirements made the position still more difficult. The Indian medical units had collected quantities of valuable medical stores and attempted to send these to Singapore: unfortunately they were diverted to Malacca and later fell into enemy hands.

Derham was anxious for the safety of the 2/10th A.G.H. at Malacca, and was faced with the problem of moving their 800 tons of equipment. Colonel E. R. White made a special trip to the divisional headquarters to make the necessary arrangements. The 2/4th C.C.S. sited near Kluang was ready, and was taking sick from the 2/9th and 2/10th Field Ambulances. Already it was notable that despatch riders provided a number of casualties, the most usual injury being compound fracture of the tibia. This unit was instructed to send all sick to the 2/13th A.G.H. at Tampoi, Johore Bahru, and to keep its beds clear. A number of officers and nurses from the 2/10th A.G.H. were quartered there also while the hospital was moving.

In the beginning of January the 22nd Australian Infantry Brigade was at the Endau-Mersing area and the 27th Brigade at Jemaluang-Kluang. A reconnaissance of the north-western area of the State of Johore had been carried out as a foreshadowing of the involvement of the A.I.F. in this sector. On 6th January units of the 27th Brigade including the 2/10th Field Ambulance were placed on short notice for movement towards Tampin should landings occur on the coast of Malacca. Next day the Japanese landing at the mouth of the Selangor River was menacing Kuala

Lumpur, and, as we have seen, the III Indian Corps had withdrawn to the Slim River. Warning notice was given to the A.I.F. that the 27th Brigade was to move to the Segamat-Muar area on the 8th. The 45th Indian Infantry Brigade was now in the Jasin-Muar area for the defence of Malacca, served by the 38th Indian Field Ambulance under Lieut-Colonel Neal and the 5th Indian C.C.S. The 2/10th Field Ambulance was able to take 200 casualties underground, but Sheppard, who had been making reconnaissances in the Kluang area, was prepared to move with the 27th Brigade.

The defenders mustered at the Slim River were heavily attacked on 7th January by Japanese tanks and strong infantry forces, which gained control of a bridge on the main road. This resulted in the loss of British and Indian transport which was on the far side of the river. Losses of men were extremely heavy, and the 11th Indian Division was forced to withdraw, and as a result the exhausted troops lost all cohesion as a fighting force. Their remnants, joined by the 22nd Brigade of the 9th Indian Division from Kuantan, made an attempt to hold the Japanese from Kuala Lumpur.

DEFENCE OF JOHORE

On 7th January General Wavell arrived in Singapore. He had left Delhi on 5th January to take up supreme command of the new "ABDA" area (American, British, Dutch, Australian), and before his headquarters in Java had been established visited the Malayan front on the 8th. He agreed with Generals Percival and Heath that the line must be withdrawn behind Gemas-Muar, and that the tired Indian troops must be rested.

Accordingly a plan was laid down that III Indian Corps after delaying the enemy north of Kuala Lumpur, should retire to Johore, the 8th Australian Division less the brigade in Mersing area should move to the north-western frontier of Johore to engage the enemy on the Segamat-Muar River line. The 8th Division was to relieve the rearguard of the III Indian Corps, thus enabling that formation to take over the responsibility of the east and west coasts of southern Johore. This brought the reconstituted 9th Indian Division under command of Major-General Bennett, while the 22nd Australian Infantry Brigade came under General Heath's command.

The position of the 2/10th A.G.H. was no longer tenable, as it was now virtually in the front line, and the staff were engaged in the heavy task of removing the unit to another site. Some nurses and other members of the staff had been sent to the 2/13th A.G.H. at Tampoi on 6th January, and by the 10th all patients had been removed from Malacca and the remainder of the staff were at Kluang with the 2/4th C.C.S. The day after the unit had left Malacca the site was heavily bombed. Colonel White and Matron Paschke visited Singapore on 13th January and inspected a site at Oldham Hall, a school two miles north of Singapore, where the staff in a remarkably short space of time converted an old school with inadequate sanitation to a military hospital. The



Malaya.

members of the unit were reunited and began work at Oldham Hall on 15th January.

A defensive line was taken up at Segamat, where the force under command of Bennett, consisted of the 27th Australian Brigade Group, the remains of the 9th Indian Division and the partly trained 45th Indian Brigade. To this was added later a brigade of the recently arrived 18th British Division. At a conference with Brigadier Maxwell, Sheppard pointed out that Yong Peng, suggested as the new site for his M.D.S. was not far enough forward, and as Neal's ambulance placed its M.D.S. in the Muar area, he was able to establish his M.D.S. at Genuang Estate, where he obtained some medical supplies from Dr McKay in the local civil hospital. The 2/10th Australian Field Ambulance therefore cleared casualties from the 27th Australian Brigade Group, and the 38th Indian Field Ambulance those from the 45th Indian Infantry Brigade; the 2/3rd M.A.C., now under the control of Westforce, provided transport to the 2/4th C.C.S. at Mengkibol, and the light section of the 5th Indian C.C.S. then at Rengam. Medical services for the 9th Indian Division were provided by the 15th and 275th Indian Field Ambulances. This force, known as "Westforce", which had its advanced headquarters at Yong Peng, and later at Labis, waited on the Segamat line to allow the hard hit 11th Indian Division to pass through on its way to the rear. The medical dispositions of Westforce were controlled by Colonel Derham, who took over the responsibility from the D.D.M.S. III Indian Corps.

Malaria prevention was given serious consideration in these areas. Atebrin was available as a suppressive drug and was held in all A.I.F. medical units for immediate use, but on the urgent request of the D.D.M.S. Malaya, in order to conserve supplies atebrin was withheld in favour of quinine as a suppressive drug until Bennett intervened, and ordered that atebrin be used. The dose then recommended was two tablets twice a week.

The question of red cross emblems was also discussed. Practices differed in Malaya. Following reports from the Western Desert that red crosses made ambulances conspicuous, the custom of painting them out was adopted in the A.I.F. in Malaya, though most of the stationary medical units showed red crosses which were conspicuous from the air. Early in December, however, an instruction was given by Malaya Command that no camouflage be adopted by motor ambulances, though no specific instruction was given about red crosses. Only small crosses were used by the 2/3rd Australian M.A.C. while operating with the III Indian Corps. Derham on his own authority after observing hedge-hopping planes and snipers firing on vehicles on narrow jungle roads, ordered conspicuous crosses to be painted on the roofs and sides of motor ambulances. He was certain from personal observation that these emblems were respected, and lives were thus saved.

The weight of the attack was still on the central and western sectors, where the Japanese had elected to make their southward drive, but landings were also expected on the east coast. To counter these landings

defences had been provided in the Mersing area, as has been already told, and here the combined troops under Heath made up Eastforce. The 2/9th Field Ambulance was attached to the 22nd Australian Infantry Brigade which was part of Eastforce, and supplied advanced dressing stations in the perimeters of the 2/18th and 2/20th Battalion positions at Mersing. Farther north on the coast a forward group of troops covered the beaches at Endau, and from here evacuation was arranged by road to Mersing, with an alternative route by motor boat. Preparations were also made for holding casualties in the advanced dressing stations in the event of part of the force being cut off. The main dressing station was at Kota Tinggi, from which point the motor ambulance convoy supplied transport to the 2/13th A.G.H. at its Tampoi site in Johore Bahru. This direct route was not practicable for some days, as the roads were blocked by floods, and an alternative route was used *via* Jemaluang to the 2/4th Casualty Clearing Station at Kluang. This unit was receiving patients from all neighbouring quarters, taking advantage of its central location. Most of the patients suffered from medical ailments and not at this stage from combat injuries.

Lieut-Colonel Hamilton was acting as area commandant for medical units in the Kluang-Mengkibol area, and looked after the 2/3rd M.A.C. The ambulance train at Kluang Station took casualties to Johore Bahru, and Major Dick supplied vehicles for road transport. The 2/4th C.C.S. was under the local administration of the D.D.M.S. of III Indian Corps, while Colonel Derham was responsible for operational movements of A.I.F. medical units and Lieut-Colonel Glyn White was in charge of evacuation to the general hospitals.

The Japanese forces were moving south more rapidly than had been expected. The 9th and 11th Indian Divisions had suffered further losses in the fighting north of Kuala Lumpur, and Wavell who visited the front on 13th January cabled the Chiefs of Staff that the battle of Singapore would be "a close run thing".

GEMAS, MUAR AND SEGAMAT

On 14th January the 2/30th Battalion made contact with the enemy on the Gemas-Segamat line, and ambushed a force of Japanese who were on bicycles. Some hundreds of Japanese were caught in the trap, and though the rear of the ambushing company was attacked by the returning enemy the cost of the engagement was small. General air attacks were suffered over the area, but further success was gained by the 2/30th Battalion at Gemas. The enemy attacked here, twenty miles north of Segamat, but was repulsed with losses much heavier than those of the Australians. The R.M.O. of the 2/30th Battalion, Captain John Taylor, sent wounded back to the forward post of the 2/10th Field Ambulance at Batu Anam, and through an A.D.S. to the M.D.S. at Genuang, five miles south of Segamat, on the direct road to the 2/4th C.C.S. at Kluang. Throughout the battle of Gemas patients reached the C.C.S. over ninety miles of narrow winding road in an average time of six hours. For the

first time the 2/4th C.C.S. received convoys of surgical cases, and though the casualties were lighter than expected, the staff worked all night in the theatre.

The A.I.F. troops were cheered to see friendly planes over this area, but this effort could not be continued, for reinforcements of planes could not be brought in time, and opportunities for ground organisation and maintenance rapidly dwindled. Already serious inroads had been made on the small and inadequate air force, while the Japanese sea forces were able to maintain adequate air cover. A threat was developing also on the east coast where the Japanese air force had bombed Endau. For the first time the 22nd Australian Brigade under Brigadier H. B. Taylor made contact with the enemy north of this point. The 22nd Brigade Group on 14th January included 2/18th, 2/19th and 2/20th Battalions, with the 2/9th Field Ambulance, which had its M.D.S. at Kota Tinggi. When the 2/10th Field Ambulance moved to Segamat an A.D.S. was left on the Kluang-Jemaluang road until this could be taken over by the 2/9th Field Ambulance.

On the south-western end of the defensive line Muar had been subjected to heavy air attack for some days. On the 15th the Japanese had penetrated to the Muar River, and had landed parties between Muar and Batu Pahat. The staff of the 2/2nd Convalescent Depot at Batu Pahat found themselves in the peculiar position of being front line troops and were compelled to move. News that the Japanese were landing on the south-east side of the Kanan River and that they were advancing towards Batu Pahat made Lieut-Colonel Webster take prompt action. Motor transport trucks were commandeered and all available patients were taken to Johore Bahru. Though the Japanese bombed and machine-gunned the area when the troops were being assembled, there were no casualties. The 45th Indian Brigade which was responsible for the defence of the Muar area was faced with a difficult task, especially in view of the comparative inexperience of its troops. The 38th Indian Field Ambulance was sending wounded to the 5th Indian C.C.S. at Rengam. The country was swampy, and intersected by the continually winding Muar River, which was crossed by ferries. The civilians employed on the ferries had disappeared when the attacks began, casting an additional burden on the troops. A powerful Japanese force had outflanked the 27th A.I.F. Brigade, and now faced the 45th Indian Brigade across the river. After sharp fighting the Indians withdrew to Bakri, thirty miles from Yong Peng, where the headquarters of Westforce was established.

Bennett promptly sent the 2/29th Battalion to this front, and Percival moved the newly arrived 53rd Brigade Group to Ayer Hitam, west of Kluang. On the 16th the Japanese landed troops by coastal barge in the vicinity of Batu Pahat. Further Australian forces were brought in by the transfer of the 2/19th Battalion A.I.F. under Lieut-Colonel Anderson from Jemaluang to the Muar area near Bakri. On arrival at Yong Peng Anderson found the position at Muar was obscure; the enemy forces were in fact in greater strength than was suspected at the time.

There was considerable enemy air activity. The 2/19th Battalion arrived three miles east of the Bakri cross-roads on the 18th. There the R.M.O., Captain Lloyd Cahill, made contact with the 38th Indian Field Ambulance which sent a waggon to collect wounded of the 2/29th Battalion, though without success. A little later that evening it was reported that Captain V. Brand, R.M.O. of the 2/29th Battalion had wounded men farther forward but these could not be moved till further contact had been made. Only two sick men were evacuated from Muar.

After their landing at Batu Pahat the enemy cut the communication with Yong Peng. It was now known that a division of the Japanese Imperial Guards and other strong troops were at Muar. The inability of the 45th Indian Brigade to withstand the heavy enemy pressure at Muar resulted in the encirclement of the 2/29th and 2/19th A.I.F. Battalions, which had suffered heavy casualties particularly among officers. Later it was found that the losses exceeded 50 per cent of those troops engaged. There was now a risk that Westforce might be cut off from Singapore Island, for the Japanese on delivering their attacks on the 45th Indian Brigade had been some fifty miles behind the Australian flank. This made further withdrawals from the Segamat line necessary: this sector will be dealt with later. On 18th January the Muar front was brought under command of the III Indian Corps.

Fighting continued all the following day on both flanks of the 2/19th Battalion, and by evening Cahill had fifty wounded to care for. Further casualties from the 2/29th Battalion, the 2/15th Field Regiment, and 45th Indian Brigade brought the total to 100 in the battalion area by evening. No contact could be made with the 38th Indian Field Ambulance. During the heavy fighting this unit had dealt with 210 casualties. Unfortunately one of the severe losses of the 45th Brigade during this withdrawal was the cutting off of one company of the 38th Field Ambulance. Major Dick volunteered to work up to the isolated A.D.S. with the Australian M.A.C. but this was not practicable. The Japanese had complete road blocks to forward areas shortly after the action began. Early on the 20th Anderson decided to take the wounded in trucks and try to return to Yong Peng across the bridge at Parit Sulong. Leaving Bakri the force, known as "Bakri" Force composed of the 2/19th and the 2/29th Battalions and the 45th Indian Brigade, had to break through road blocks against strong enemy resistance and many more casualties occurred. The last road block was passed at dusk and the force with the wounded in trucks in convoy with the ambulance waggon approached Parit Sulong late at night. This was a most difficult journey necessitating deployment through swamps, and the forcing of road blocks, under constant menace from a large hostile force. The next day, the bridge at Parit Sulong was reached, but it was held by the enemy.

Excellent work was done here by the R.M.Os. Cahill and Brand, and stretcher bearers, who rescued many wounded under fire and brought them back to the relative safety of the crowded vehicles. Air attacks added to the casualties, and Cahill estimated the total number at about 400.

Anderson instructed that no wounded should be left on the perimeter at night; fortunately, many of them were able to walk. A request was made by radio for medical supplies to be dropped from the air, and on the 22nd an old Vildebeeste plane accurately dropped food and supplies of morphine, released a stick of bombs on the enemy and miraculously escaped safely. Anderson, who had succeeded to command of the force when Brigadier Duncan of 45th Brigade was killed, tried to arrange for the Japanese to allow wounded in the encircled Australian lines to pass through, but without success. A number of seriously wounded men from the 2/19th Battalion were sent in a truck showing a red cross with a volunteer driver to the hump-backed bridge over the river till checked by a guard. An officer in the village to whom the driver was taken, refused permission to pass unless the force surrendered. This condition was rejected. The truck was not allowed to return but was incorporated in the road block. After nightfall Lieutenant Austin, one of the wounded, contrived to release the brakes of the truck, allowing it to slip back off the bridge till the engine could be started under veil of the noise of battle. The wounded were then returned near the perimeter for the night. An attack on the bridge was not successful. Next day a general order to withdraw was circulated. The walking wounded made the best of their own escape, and Cahill and some of the more severely wounded contrived to cross the river and escape the Japanese. Only the walking wounded returned, excepting those who were carried by their comrades including Cahill. Some enemy tanks were destroyed, though at the cost of casualties, and the Japanese ahead were attacked and dispersed. Unsuccessful attempts were made to rescue the force through a cross road to Yong Peng. All guns and vehicles were destroyed, and unfortunately no lying wounded could be taken. Only those who could walk made their way back to Yong Peng by jungle paths; some took days to regain the Australian lines. Trucks containing severely wounded men were fired on by the Japanese; some were blown up and set on fire, and most of the wounded were massacred by their captors. Some of the men who reached Yong Peng arrived there before divisional headquarters had left, others arrived later, and were taken prisoner by the Japanese. Of these latter some were taken back to Kuala Lumpur, and eventually rejoined their fellows in captivity on Singapore Island. Despite the tragic losses this episode was an epic which probably prevented the encirclement of a much larger force at Segamat, and the bravery of the commander of "Bakri" Force and his men was equalled by their consideration of the wounded. On 25th January Wavell signalled his appreciation of this determined stand.

WITHDRAWAL FROM SEGAMAT

It is necessary now to return to the Gemas-Segamat sector where fighting had been going on since the early repulse of the Japanese by the 2/30th Battalion under Lieut-Colonel Galleghan. On 15th January the enemy had a force of about three battalions with tanks and were digging

in on part of the battalion front. Australian attacks were launched and were met by intense fire and dive-bombing. Owing to lack of numbers the objectives could not be reached, and the battalion was forced to withdraw. Heavy rain added to the difficulties. There was a lull in the fighting, with the Japanese very active in restoring destroyed bridges, but the brigade commander, in view of the position on the whole line, ordered the 2/26th Battalion to relieve the 2/30th Battalion and under increased pressure from the Japanese on the ground and in the air a withdrawal behind Segamat began.

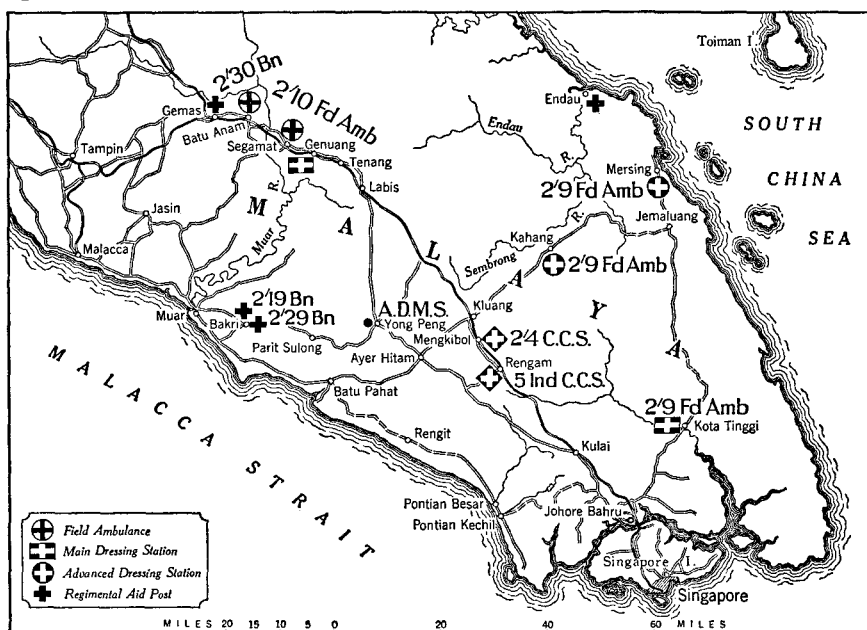
The 2/10th Australian Field Ambulance which was serving the 27th Brigade, and had its M.D.S. at Genuang received its first casualties on 15th January mainly bullet and bayonet wounds. All arrangements for treatment and transport to the C.C.S. were carried out with speed and efficiency. Captain R. M. Mills was sent out at midnight on the 18th from the field ambulance with three motor ambulances and two utility trucks bearing red crosses to pick up casualties expected from the 2/26th Battalion. No casualties were found, though the party waited till dawn, but the Japanese troops had penetrated so far that their rifle-fire was within some two hundred yards. On 18th January Derham, realising the threat to communications with Johore, recommended to the G.O.C. and H.Q., A.I.F. that all nursing sisters and masseuses should be evacuated from Malaya. Bennett refused because of the bad effect on civilian morale. Derham was anxious for the safety of the nurses, and asked for news from the 2/4th C.C.S. twice a day while he was at Yong Peng, to which the advanced headquarters had now retired from Labis.

The 2/10th Field Ambulance moved to a site one mile north of Labis, owing to the move of a field battery into Genuang, and to the general retirement. A mobile A.D.S. was in the vicinity of Tenang, under Captain Crabbe, who next day moved the A.D.S. back with the 2/26th and 2/29th Battalions. The 15th Indian Field Ambulance was then near Labis, and the 38th Indian Field Ambulance still near the Yong Peng-Muar road junction. On 20th January Sheppard chose a site for his M.D.S. at Socfin Estate, with the relay post of the 2/3rd M.A.C. However, further penetration by the Japanese on the west flank caused the 2/26th and 2/29th Battalions to withdraw near the Yong Peng cross-roads, and the M.D.S. of the 2/10th Field Ambulance was accordingly drawn back to the Mengkibol Estate near Kluang. The 198th British Field Ambulance placed at Yong Peng was able to deal with the casualties of the 53rd British Infantry Brigade. Rearguards from both Muar and Segamat sectors were passing through Yong Peng.

Hamilton had been informed by Derham on the 17th that the Japanese had penetrated the area round Yong Peng, and that there were snipers in the vicinity. Road traffic was being bombed at this time, but there was still a reasonably safe exit for the 2/4th C.C.S. through Rengam. Derham sent this message on the 19th to the C.C.S. commander

There are now none of our troops between you and the enemy. Send nursing sisters to 2/13th A.G.H. immediately, and move south to selected position as soon as possible.

It was reassuring to know that the thirty miles between the unit and the Japanese was swampy country. The Fraser Estate near Kulai, twenty-two miles north of Johore Bahru, was chosen for the site, the 2/3rd M.A.C. cleared the wounded with all available ambulances, and the C.C.S. moved forthwith, and arrived at the site on the night of the 19th/20th. During the move Hamilton acted in cooperation with Lieut-Colonel Pearson of the 5th Indian C.C.S. at Rengam. While at Kulai, the 2/4th C.C.S. admitted wounded from the Muar-Yong Peng area, and also handled a large number of Indian wounded and sick. The 1st Malayan C.C.S. under Lieut-Colonel R. Malcolm R.A.M.C. assisted in the medical attention on Indian patients and shared the operating theatre. The 5th Indian C.C.S. then retired to Singapore. The 2/4th C.C.S. left a light section at Kluang, with its surgical team, and worked in conjunction with the 2/10th Field Ambulance at the Mengkibol Estate. Kluang was now virtually a battle area.



Southern Malaya, 16th January 1942.

ACTION IN THE EAST

Meanwhile on the east coast tension was rising. Though there was little enemy pressure on land heavy air attacks were made on Endau and Mersing. The 2/9th Field Ambulance received an increasing number of casualties, but these were still preponderantly due to illness and not to combat. On 17th January Summons established a post at Kahang, on the Kluang-Jemaluang road on the site previously occupied by the A.D.S. of the 2/10th Field Ambulance. The M.D.S. of the unit was at Kota

Tinggi. The Mersing area was again bombed and the following day bombs fell near the A.D.S. at Mersing, but it was believed that the Japanese had respected the red cross emblems shown there by order of the brigade commander. The 2/19th Battalion was preparing to move in reinforcement of troops engaged at Muar, and expected at that time to be replaced by the 5th Norfolks. General Heath began the removal of stores from Mersing on the 18th, since attacks from the air were increasing. With the 2/4th C.C.S. at Kluang, on the eve of moving south, the retreating troops were left with only the field ambulance within easy reach, and movement into the central parts of South Johore was becoming more difficult owing to the great flow of traffic.

On 20th January General Wavell again visited Singapore and discussed the situation with Generals Percival, Heath and Simmons (fortress commander). On the following day in the central western sector conferences were held at Yong Peng, and two days later at Rengam.

The seriousness of the position was emphasised by a further landing by the Japanese on the east coast at Endau on 21st January. Eastforce now included all troops on the east coast and was commanded by Taylor of the 22nd Brigade. Its task was to hold Jemaluang and Kahang and to maintain detachments in the Mersing area. The Japanese invading the east coast were making their way down south. The task of checking them was of course much more difficult by reason of the necessity for part of the 22nd Brigade to be sent to the aid of Westforce, and also the complete disappearance of the last aircraft which could hold their own with the enemy. The 2/18th Battalion ambushed a force of 400 Japanese on the night of 26th/27th January, but as will be seen Eastforce was then required to join in a withdrawal to Singapore Island.

As a result of the conferences at Yong Peng and Rengam orders were given for withdrawal from Yong Peng, and for the regrouping of all forces in Southern Johore. As a corollary a decision was made that Mersing was not to be held.

Wavell thought it probable that the forces would be driven from Johore to Singapore Island, and had already cabled Mr Churchill that if Johore were lost the island defences might not be able to hold out for long. He reiterated a warning as to the weakness of the northern defences of Singapore.

MOVEMENTS OF MEDICAL UNITS

The position in Northern Johore was reflected in the movement of the forward medical units. Major Krantz and Captain Brereton, the surgical team from the C.C.S., returned from Mengkibol on 23rd January; it took them all night to travel the forty-eight miles to Kulai. The 2/10th Field Ambulance at Mengkibol was also retiring; combatant units were crowding even the site of the field ambulance as the enemy advanced. Brigadier D. K. Seaver, D.D.M.S. of III Indian Corps, calling at the 2/4th C.C.S. at Kulai, was uncertain of the whereabouts of some of the medical units then under corps control. The ambulance train on its way south was attacked from the air. Neal managed to withdraw the remainder of his

38th Indian Field Ambulance under enemy pressure. The 2/9th Field Ambulance began an orderly retirement with the forces on the east coast, performing "leap frog" manoeuvres, and, like the other units, moving at night. The roads were under continuous air attacks by bombing and machine-gunning, though individual motor ambulances carried out by day urgent missions in which their red cross emblems were respected.

The 2/4th C.C.S. continued working busily at Kulai, and in conjunction with the 1st Malayan C.C.S. handled many Indian soldiers, who were noticeably young and inexperienced. Both the main part of the C.C.S. and its Indian annexe were full, and the staff were glad of the protection of the rubber trees. The 2/3rd M.A.C. transported casualties from the western sector through the C.C.S. at Kulai to Johore Bahru and Singapore Island, and from the Mersing and Jemaluang areas direct to the 2/13th A.G.H. at Johore Bahru and the 2/10th A.G.H. at Oldham Hall.

The base medical units were both committed to the vast task of moving a general hospital. The 2/10th A.G.H. as we have seen, left Malacca on 10th January. Some of the staff had been attached to the 2/4th C.C.S. at Kluang for several days, and others were there till 13th January while Colonel E. R. White concluded arrangements for the re-opening of the unit at Oldham Hall on Singapore Island. A few days after Oldham Hall was occupied Manor House, a large boarding house half a mile away, was also taken over for the housing of surgical cases, and thereafter continued extensions were made by using a number of private houses and erecting tents in the grounds of the two main hospital buildings. Battle casualties from the Mersing and Jemaluang areas were being sent to the 2/10th A.G.H. which had settled into its new site and by the 26th January was accommodating 538 patients. The hospital was now re-assembling all officers and nurses who had been detached to other units.

The 2/13th A.G.H. which had been working at Tampoi Hill, four miles from Johore Bahru since the end of November 1941, now had to leave this site for one on Singapore Island. When the 2/10th A.G.H. left Malacca, and until this unit was re-established at Oldham Hall, the 2/13th A.G.H. had to expand from 600 to 1,200 beds at very short notice, as it was temporarily the only A.I.F. hospital in full tide of work. In the remarkably short time of thirty-eight hours the patients and equipment were transferred to the new site in St. Patrick's School twenty-five miles away on the south side of Singapore Island. These moves of the hospitals, accomplished under emergency conditions, could not have been so successfully carried out without the joint efforts and cooperation of Lieut-Colonel Glyn White and Captain Vincent, the commanders, matrons and members of staff.

Following on the move of the 2/13th A.G.H. from Johore Bahru the 2/4th C.C.S. having been previously warned that movement was imminent, transferred to the old mental hospital at Johore Bahru on the night of 25th/26th January. It was obvious that the C.C.S. could not remain there, but had to seek a site on Singapore Island.

During the actions north of Johore Bahru precautions had been taken to remove large quantities of medical stores from Singapore Island to ensure that medical supplies would be available in the field in case communications were cut. These stores had been augmented by salvaging supplies from civil hospitals in the north, and even a Japanese dispensary at Mersing. Unfortunately some of these were lost in the confusion of traffic incident on the retirement, but some were saved for future use.

The 27th Australian Infantry Brigade was engaged in action at Ayer Hitam on the 25th, and the 2/20th Battalion A.I.F. withdrew from Mersing. The inevitable loss of the triangular area between Yong Peng, Kluang and Ayer Hitam made further withdrawal necessary.

WITHDRAWAL TO SINGAPORE ISLAND

On 27th January Wavell gave Percival permission to withdraw the whole force to Singapore Island if he considered it necessary. Arrangements were now made to effect this withdrawal, and to defend Singapore Island with such means and improvisations as could be devised. It was necessary to evacuate as many patients as practicable along assured though crowded routes, but the withdrawal of the field forces was perforce a last minute performance on the selected withdrawal lines; it was necessary to leave parts of the field ambulances with the retreating troops as long as possible. Thus it happened that advanced dressing stations moved back only as the last defenders withdrew. Aid posts proved their claim to be called mobile, though this made it difficult for roving ambulance cars to find them. The sections of the field ambulances were more or less independent, but the light section of the C.C.S. which was still working in the central sector, had no transport vehicles of its own and was compelled to resort to any useful expedient. By relays the patients were moved, and fortunately none of these were injured, nor any of the staff of the medical units. On 26th January Hamilton inspected possible sites for the 2/4th C.C.S. on Singapore Island. The suggested site at Singapore dairy farm was quite unsuitable, but a good position was found in the Bukit Panjang English School, which was relinquished by the R.A.F. after negotiation. It had the drawback of being in a target area, but there was little choice. The main body of the unit moved in on the next day, leaving, by request of Brigadier Seaver, a light surgical section for a few days. The nurses rejoined the unit on 29th January. On the same day the III Corps headquarters on an exposed hill in Johore Bahru was bombed, an ominous sign for the future.

The 2/9th Field Ambulance was still receiving up to eighty wounded a day from the 2/18th Battalion, but the headquarters moved the same day, the 27th, to Singapore and there set up a 200 bed hospital at Hill 80. The M.D.S. of the 2/10th Field Ambulance moved the following day to a site under trees at Bukit Panjang, opposite the 2/4th C.C.S. A light mobile section maintained an A.D.S. at the former site of the 2/4th C.C.S. at Johore Bahru while withdrawal was proceeding. A detachment moved with the 27th Australian Brigade.

The D.D.M.S. III Indian Corps made arrangements for medical attention of troops crossing the causeway from Johore. These consisted of an M.D.S. of the 38th Indian Field Ambulance, reinforced by a resuscitation team from the 2/10th Australian Field Ambulance. During the retreat from the mainland Red Cross units were in daily contact with all field medical units, and by using mobile stores and a mobile headquarters additional comfort was given to the sick and wounded. Major Dick's motor ambulance convoy which had been in action from the 8th December 1941 was the last to give medical service to units on the mainland.

Eastforce ensured the safety of the roads to the island, and by the night of 30th/31st January all British and Australian forces had crossed the Johore Causeway and reached Singapore Island. Difficulties of movement and of traffic congestion made impossible the salvage of valuable equipment and fighting material, which was left on the mainland. It is ironic that on this same day, 30th January 1942, the movement known as "Step-sister" began, by which the 6th and 7th A.I.F. Divisions embarked from the Middle East with the original purpose of bringing Australian reinforcements to Malaya.

DEFENCE OF SINGAPORE ISLAND

The utmost confusion prevailed on the overcrowded island after the causeway was passed. The location of units was not always suitable; fixed defences were not duly planned, and artillery and other defence forces were sometimes in close proximity to medical units. The 18th British Division had arrived as a reinforcement on the day the withdrawal began, but like other reinforcing units was not adequately trained or armed. For purposes of defence the island was divided into three sections, northern, southern and western. In the western area, which the Australians were defending with the 44th Indian Brigade under command, were the 2/9th and 2/10th Field Ambulances, attached to the 22nd and 27th Infantry Brigades respectively. After crossing the causeway the 2/9th Field Ambulance opened their M.D.S. on the road running west from Bukit Panjang, with an A.D.S. on the cross road from Bukit Timah. The 2/10th Field Ambulance as we have seen, occupied a site under rubber trees near the 2/4th C.C.S. at Bukit Panjang, close by also was Dick's headquarters of the M.A.C. The British and Indian field medical units serviced the troops in the other sectors.

The medical units were strained to capacity. Owing to the shortage of beds in hospitals field ambulances were instructed to hold minor cases, each ambulance to expand to provide accommodation for 150 to 200 patients. All the field medical units were busy with matters of hygiene and defence, and making blast-proof shelters and slit trenches. Owing to the danger of interruption of the piped water supply the water of all wells was checked. Malaria had been appearing in increasing frequency, and more was expected in men exposed to infection in the later periods. At a joint conference it was emphasised that certain areas, such as those occupied by the 2/30th Australian Infantry Battalion and the 44th Indian

Infantry Brigade were potentially or actually malarious. All oiling had ceased, and quinine taken as a suppressive had not proved very effective; in the light of more recent knowledge this is not surprising.

The field medical units treated many men for exhaustion states at this stage. Some of these men were affected by the tiring retreat and by all the psychological stress that such a movement implies, others in addition had made long and hazardous journeys from the areas now infiltrated by the Japanese. One party of thirty-three from the 4th Norfolk Regiment, cut off from Yong Peng after the fighting at Parit Sulong, arrived at the 2/4th C.C.S. utterly worn out by a dangerous journey in stolen sampans. The patients in medical units as well as the defenders of the island were under increasing stresses from the ever intensifying air attacks. On 1st February the medical units at Bukit Panjang were alarmingly reminded of their position when planes attacking the oil tanks dropped bombs in their vicinity.

A new peril was added on the following day, when Japanese guns mounted on the mainland shelled Singapore. On this day, 2nd February 1942, the naval base was abandoned and the floating dock demolished. One result of this increase in the tempo of the attack was a rising incidence of exhaustion states and neuroses, including some probably self-inflicted wounds.

Bombs also fell near the M.D.S. of the 2/9th Field Ambulance. This unit was busy during the first week in February digging in and treating patients, mainly sick, whose numbers rose to 100, owing in part to the increasing strain on the hospitals. From 28th January to 8th February the 2/10th Field Ambulance treated 667 A.I.F., 15 British and 25 Indian casualties. Also approximately 250 natives mainly women and children, were treated as a result of the bombing and shelling of native villages. On 5th February the 2/4th C.C.S. was within the range of enemy artillery; this made a move necessary, which was carried out on the following day. Suitable sites were now becoming more difficult to find, and as the movement was steadily towards the city area congestion increased. The presence of a large number of civilians on Singapore Island was an embarrassment, particularly with regard to accommodation. After viewing a site in a quarry with disfavour, Hamilton managed to transfer his unit to the Swiss Rifle Club.

Both the 2/10th and 2/13th A.G.Hs. were overcrowded. The 2/10th A.G.H. after taking over additional houses and erecting tents had accommodation for 745 patients and on 5th February had 709 beds filled. Bennett was troubled by the cramped space in the wards but this was unavoidable. The 2/13th A.G.H. at St. Patrick's School on the south coast had 522 beds occupied at this time, and accommodation for 825 patients. All available space was used, including the gymnasium and chapel. As the work increased the surgical wards were concentrated in the main building, for the sake of efficiency, and the medical staff were accommodated near to hand. The rising number of serious wounds, especially of the head, thorax and abdomen imposed an increasing strain

on the surgeons. On 7th February Bennett pointed out the risk to the 2/13th A.G.H. in being sited in a building on the coast, but the risk of units well within the perimeter was also very real, as was seen the same day in the shelling of the 2/10th A.G.H. at Manor House when two members of the staff were killed and other men wounded.

The damage done was not great, but the moral effect on patients was bad. The 2/2nd Convalescent Depot had difficulty in carrying out its work on the island, particularly as it moved four times in a few weeks: at this time the unit was working at the Island Golf Club.

On the morning of the 8th a sporadic enemy barrage began; this intensified during the afternoon and evening, and throughout the night the Japanese landed. They used all sorts of craft; some even swam the straits. On the same day the A.D.Ss. of the 2/9th and 2/10th Field Ambulances with the battalions were heavily shelled. The dental utility truck of the 2/10th Field Ambulance received a direct hit and was destroyed: up till then dental work had been carried on.

High level and dive-bombing continued to be intense, though temporarily discouraged by the appearance of Hurricanes. However, the air force strength was so attenuated and hopelessly outnumbered that as many of the personnel as possible were evacuated. Following the Japanese landings bitter fighting continued. Though there was seldom a defined front and conditions were confused, the pressure of superior numbers of fresh enemy troops was strongly resisted. Nevertheless, the defence perimeter was perforce being further contracted, and these actions imposed still more difficult conditions on the medical units. The proximity of artillery units forced the 2/4th C.C.S. to leave the Swiss Club. Temporarily this unit settled in Gilstead Road, leaving a surgical team behind to work with the 2/9th and 2/10th Field Ambulances which had moved to this site and were running a combined casualty reception hospital.

Summons suggested that a Red Cross area be formed which could be notified to the Japanese, thereby ensuring greater safety to the patients. At A.I.F. headquarters this plan was not approved, but Derham continued to do all he could to clear combatant units away from medical areas. Australian units, when acquainted of the position readily moved away, but this good example was not always followed. The heavy fighting produced many casualties; the hospitals were even busier, with operating theatres working night and day. Movement added to the difficulty of caring for patients. The 5th Indian C.C.S., the 1st Malayan C.C.S., the 2/4th C.C.S., and the 2/10th A.G.H. all had to move on or about 9th February, as well as other field units. The sanitary service failed, and civil labour virtually disappeared.

On 10th February Wavell visited Singapore and conferred with Percival and Bennett. Low flying Japanese bombers attacked the bungalow where the headquarters was situated, fortunately without serious results. In view of the rapid progress of the enemy Wavell ordered a counter-attack by all troops possible, and issued an "order of the day". In this he pointed out that other national forces had held out against greater odds, and that

neither troops nor civilians should be spared in the coming actions. There could be no thought of surrender, and senior officers must lead their troops, and if necessary, die with them.

On 11th February this order of the day was promulgated with a rider by Percival. This stated that

in some units the troops have not shown the fighting spirit which is to be expected of men of the British Empire—the spirit of aggression and determination to stick it out must be inculcated in all ranks. There must be no more withdrawals without orders.

When this order with the rider was given to Colonel Derham by a senior staff officer for promulgation to the A.A.M.C. units he read it and tore it up in the officer's presence. He felt that his medical units had not run away from anything, had usually been the last to retreat when retirement was ordered, and had done outstanding work, particularly the ambulance drivers and the regimental medical officers. He therefore refused to promulgate so uninspiring an order.

Stringer and Derham conferred on the medical position on the morning of the 11th immediately before the Supreme Commander's final conference. Stringer stated that conditions in the City of Singapore were rapidly deteriorating; civilian casualties were mounting and hygiene was ceasing to exist. He had advised Percival that from the medical point of view the force should capitulate before the position became uncontrolled. Derham agreed with this, and with the approval of Colonel J. R. Broadbent (A.A. & Q.M.G., A.I.F. Malaya) advised Bennett accordingly. It should be clearly understood that this advice was based on purely medical considerations; it was not part of the function of a medical adviser to give a military opinion on the wastage of life by the operations of war except where questions of preventive medicine were involved.

The Japanese were now infiltrating areas closer to the city. Early in the morning of the 11th the divisional headquarters and the Swiss Club had to be evacuated, as enemy were attacking with small arms fire. The 2/9th and 2/10th Field Ambulances and the 2/2nd M.A.C. were promptly transferred to Barker Road, and the headquarters to Tanglin Barracks. The 2/4th C.C.S. supplied medical staff for a newly formed ordnance battalion; one medical officer and fourteen O.Rs. were attached to the 2/10th A.G.H. and the balance of C.C.S. staff and equipment after staying overnight at Gilstead Road moved to the 2/13th A.G.H. Some members of the staffs of the field ambulances were also assisting in the hospitals, and these units continued to evacuate sick and wounded direct to hospital. Derham found the 2/10th A.G.H. working under very difficult conditions. Air raids were continuous, and occasionally shells fell in and around the hospital area. All the travelling on roads was hazardous, owing to shelling, dive-bombing and machine-gunning. The 2/13th A.G.H. had wards crowded with sick men, many lying close packed on mattresses on the floor. The municipal water supply was cut off but an emergency supply was obtained from an old well in the grounds.

Throughout the period of strain the nurses had been indispensable in their work and admirable in their courage and coolness. Six nurses were sent away with forty-seven patients who had been embarked on a transport for Australia on 10th February, and after concentrated air attack arrived at Batavia. On the following day sixty more nurses from the A.I.F. hospitals were embarked on the *Empire Star*. On this ship, normally for cargo with accommodation for only sixteen passengers, were civilians, troops, mostly R.A.F., British, Australian and Indian nurses, 2,154 persons in all. After the harassing experience of persistent air attacks on a crowded ship they arrived at Batavia on 14th February, and two days later sailed for Fremantle arriving without further incident. On 12th February the remainder of the nurses on Singapore Island were embarked on the *Vyner Brooke*. Unfortunately after suffering repeated air attacks this ship sank off Banka Island; only twenty-four survived.¹

THE FINAL PHASE

Meanwhile the fighting was coming closer and closer to the city area. Though the A.I.F. field ambulances were still taking casualties from the brigades, such arrangements as collecting posts for wounded could no longer be established. Shelling of the areas adjacent to Oldham Hall and the siting of guns in the neighbourhood made further movement of the 2/10th A.G.H. necessary. In six hours and with only two hours' notice 870 patients were moved with the requisite equipment at night along congested roads, subject to much shell-fire without casualty or loss. On 14th February a successful expedition was sent back to Oldham Hall to collect valuable equipment and material after the main body of the unit had settled in the Cathay building.

One hundred of the most seriously ill surgical patients with Lieut-Colonel Coates, Captains Woodruff and Puflett and nursing orderlies were transferred to the Singapore General Hospital. Another three hundred were sent to St. Joseph's Institute; about half of these were seriously ill and were under the care of Lieut-Colonel Cotter Harvey and Majors Phillips and Furner. About five hundred patients with the balance of officers and other ranks were housed in the Cathay building. The hospital occupied the lower floors of this twelve-storey building. The III Indian Corps headquarters troops occupied some of the flats in higher floors of the building, and despite urgent requests from Colonel E. R. White, refused to move. As a result the red cross could not be flown from the building, which was consequently under frequent shell-fire and bombing, adding greatly to the strain and discomfort of attending the sick and wounded. The building was often hit, and many flats were wrecked, but the lower floors fortunately escaped damage. Members of the Red Cross unit, including recent reinforcements were divided between the two hospitals, where they worked in the wards, and gave useful assistance to medical officers in the keeping of records. Unfortunately the area com-

¹ A further account of the experiences and fate of the nurses is given in Chapter 27.

missioner Mr Basil Burdett had been killed in an aircraft accident in Java, where he had flown to establish a Red Cross depot.

The 2/2nd Convalescent Depot after two moves into sites at Tanjong Katong on 11th February again moved on the 13th, this time into the Cathay cinema building adjacent to the Cathay flats. This unit combined its usual functions with those of a rest camp and a general base depot. Late on 12th February the 2/9th and 2/10th Field Ambulances moved into Oldham Hall just vacated by the 2/10th A.G.H. Derham, after consultation with Broadbent and the ambulance commanders decided that these units should take over the hospital area and remain there even if the enemy overran it. However, an hour later Malaya Command ordered that the area was to be defended, and in spite of protests guns were mounted in the hospital grounds. The two field ambulances then moved to St. Andrew's Cathedral, and there functioned as a combined unit in the Cathedral buildings and grounds, caring for the constant stream of sick and wounded. Both troops and civilians were treated; many of the troops were very exhausted.

On 13th February a combined A.D.S. was set up at Tanglin in a house on Tanglin Hill Road, by Major Hazelton, Captains Crabbe, Mills and Juttner. Shelling and bombing by the enemy continued; drivers of vehicles faced constant danger, several were wounded, and one died after injury in the Cathedral grounds. The water supply of the Tanglin area had been partly interrupted on the previous day; wells were surveyed, and the swimming pool was filled and placed under guard. On the 13th the supply was completely cut off. This danger was part of the general water shortage now threatening Singapore.

The same day Malaya Command authorised the assembling and sending of a party of 1,000 to Java by coastal vessels. It was thought that a representative body of specialists drawn from all arms and services would be of great value to the ABDA headquarters in Java, where it was hoped that successful counter-attacks against the Japanese might be made. Unfortunately this hope remained unrealised. Only about one-half of the total number of officers and other ranks who were to assemble at the docks were taken off, and the main A.I.F. party of signallers and engineers were left. Included in the party were Colonel Broadbent and Lieut-Colonel Coates. Coates following instructions from General Bennett through the A.D.M.S. embarked on the *Sui Kwong*, a small steamer which after surviving mortar-fire, sailed at dawn through the minefield for Java. Other medical officers on board were Brigadier Seaver, Colonel Percival, Lieut-Colonel Hurd-Wood, and Lieut-Colonel Hennessy, each representing a clinical or administrative specialty. Coates was the only Australian medical officer and the only surgeon. His odyssey in the Netherlands East Indies and captivity is described in the section dealing with the Burma-Thailand railway. Broadbent eventually reached Australia safely.

Rumours of the imminent visit of a hospital ship to Singapore had been current for some days, but it was now realised by those caring for the sick and wounded that this hope was not to materialise, in spite of the



Singapore Island.

repeated requests made that a ship should be sent. As mentioned in Chapter 20, the last visit to Singapore of an Australian hospital ship was that of the *Wanganella* on 17th September, and the *Manunda* sailed for Darwin from Sydney on 7th January, and remained there until 20th February.

On 13th February Pigdon, commander of the 2/13th A.G.H., conferred with his officers as to the position, for they were in an unprotected site outside the perimeter where the Japanese were expected to appear at any time. The pressure of the Japanese had concentrated the force to some extent, and some of the more outlying positions were now unsafe. Though protection of medical units by the enemy could usually be expected, the Japanese were unpredictable. When their advancing forces entered the British hospital at Alexandra on the island, they declared that the area had been used for artillery and massacred numbers of patients and members of the staff. Two weeks earlier an aircraft had attacked the hospital on a clear night, and though the Kallang aerodrome was near it appeared that this attack at least was not accidental. Pigdon was anxious that his hospital area should be respected as such. Since 11th February repeated requests had been made to various troops for the removal of machine-guns and other weapons close to and even inside the hospital area. Such actions were made with greater persistence as the military situation grew more tense, and on the 13th troops established a road block on the eastern boundary of the hospital whose flank was thus in the firing line. Pigdon was informed that this step was taken by order of Malaya Command, but he produced his orders in writing from Brigadier Stringer and Lieut-Colonel Glyn White that the hospital was not to move regardless of changes in the defence perimeter. No further attempts were made to use the area for combatant purposes, and red crosses were displayed prominently and illuminated at night. The 2/13th A.G.H. at this time held over 900 patients: suggestions made for the transfer of the hospital to an area within the perimeter were completely impracticable, for there was no area within that rapidly contracting line to which it could go. The 2/10th A.G.H. with sections already accommodated away from the main body of the unit, was full to capacity at the Cathay building.

On 14th February the 2/9th and 2/10th Field Ambulances set up a theatre with a combined operating team at the Adelphi Hotel. The risk to transport on the roads to the M.D.S. at St. Andrew's Cathedral was extreme owing to shell-fire, therefore the A.D.M.S. decided to restrict movement to the M.D.S. Water supply in all areas was now very limited; in some places there was no piped supply at all. At the Cathay buildings all the demands for water and sewerage supply for the 2/10th A.G.H. had to be met by hand carriage in buckets. Sanitation was now practically non-existent. The risks of a serious breakdown of all hygiene were clear to the combatant as to the medical officers. In the A.I.F. Brigadier Maxwell commander of the 27th Brigade, was himself a doctor.

The morning of the 15th found the position still deteriorating. Artillery had taken up positions all along the water front in close proximity to the

Cathedral. Shells continued to fall even in the grounds, where another driver was killed. The building and other accommodation were full of patients: so too was the A.D.S. at Tanglin. In all at least 960 military and 300 civilian casualties were recorded as having been treated in the Cathedral: the actual number was much higher. All the morning the Cathay building was heavily shelled. One shell penetrated the roof of the cinema occupied by the 2/2nd Convalescent Depot, killing sixteen and wounding over thirty of the patients. At this time the depot had over 1,000 patients. The lives of many of these wounded were saved by the immediate proximity of the hospital.

On 15th February during a conference of all senior commanders and the Civil Governor, Sir Shenton Thomas at the headquarters of Malaya Command it was decided that in the interests of humanity no good purpose could be served by continuing the struggle.

A representative of the forces, Brigadier Newbigging, was sent out with a flag of truce to Johore Bahru to arrange terms, but the Japanese would only treat with the commander. Accordingly General Percival met the enemy representatives, and at 1800 hours a message was sent to all formations that the forces had capitulated. At 2030 hours the "Cease Fire" order took effect. Singapore had surrendered.

During the fighting on Singapore Island the A.A.M.C. had lost four officers, Captain G. L. Lindon, Captain K. C. Madden, Captain D. J. Shale, and Captain J. F. Park.

At the time of the "Cease Fire", A.I.F. medical units still feeling keenly the absence of nurses, were functionally intact, and the staffs were carrying on with routine medical and surgical work as well as circumstances permitted. During the period 8th December to 15th February the casualties as known to the A.I.F. command at the time of capitulation are shown in the appendix.

With the fall of Singapore, about 15,000 Australians became prisoners of war. Naturally the troops were depressed by having to yield to a force which they counted as less than their equals. The civil and military conditions prevailing in Malaya are not *per se* the concern of a medical history, but certain generalisations may be made. It seems fair to comment that there was a wide degree of unawareness at least among civilians in Malaya, and those aware of the dangers did not succeed in remedying weakness and defects before the avalanche began. Everything was tragically late in this campaign, and it is not strange that from the early action periods inevitability seemed to pervade the general cast of thought. It cannot be denied, moreover, that coordination and harmony were not always outstanding features of a situation which demanded the highest degree of unity. Certain of the personalities in Malaya were mutually incompatible under prevailing conditions. Perhaps the feeling of frustration which was evident in Malaya begot aggression as it is so prone to do. Even during the months of training minor issues tended to become major, bias crept in, and spirits whose common aspirations should have united

them tasted bitterness. Yet it cannot be said that these feelings penetrated to all ranks as a definite state of mind. Where service units were given sufficient time and opportunity to acquire the technique vitally necessary to attaining mastery in the jungle, to learn the new, and still more difficult, to forget the old, they attained a high degree of success. The A.I.F. battalions in their greatest moments rose to heights of endurance and endeavour, even in retreat. Within the higher medical command harmony was not disturbed. Characteristically the A.I.F. could present at times a few thorns of independence, but relations with Brigadier Stringer, D.D.M.S. of Malaya Command, were always those of respect and genuine personal regard. With a background of capable administration Colonel Derham, A.D.M.S., and Lieut-Colonel Glyn White emerged from the trying weeks of the campaign with the full confidence of the medical corps. In the medical units commands were happy and staffs cooperative and keen to maintain high standards. The field medical units were undaunted in those times of stress, stimulated by the spirit of the men they served. The base units produced the maximum of result from the minimum of resources, and in the dark days on Singapore Island, their members, and particularly the nurses, were undeterred by the grim risks at hand and ahead.

If any lowering of general morale was discernible in the forces it was not due to medical causes. Relations of the medical services with the command were not always unstrained, but difficulties were those of temperament. When the night of 15th February closed in with almost unnatural calm, though none among the British forces on the island could foretell what the future might bring, the members of the medical services had their own absorbing work at hand, then and tomorrow.

APPENDIX

A.I.F. CASUALTIES MALAYA¹

8th December 1941—15th February 1942

Killed in Action	405
Died of Wounds	111
Wounded in Action	1,364 approx.
Missing	1,919 (33 A.A.N.S.)
Illness (Deaths)	8
Illness (Admissions)	6,000 approx.
Accidents (Deaths)	25
Strength of A.I.F. . . .	15,000 approx.

¹ This table gives the figures as known to the medical command at the time of the movement of the force, after capitulation, to the Changi prisoner-of-war camp.

MIDDLE EAST AND FAR EAST
AUSTRALIAN MILITARY FORCES
CASUALTIES—WAR WITH JAPAN—PRISONERS OF WAR²

	Malaya	Java	Timor	Ambon	New Britain and New Ireland
Killed in action and missing presumed dead	2,178	237	234	344	1,092
Died of wounds	111	2	2	1	5
Died of wounds whilst P.O.W.	25	1	12	—	2
Died of sickness, disease and injury whilst P.O.W. . .	4,250	512	131	443	25
Total deaths	6,564	752	379	788	1,124
P.O.W. escaped, recovered or repatriated	10,618	2,020	842	303	65

² This table gives final figures as supplied by the Central Army Records Office for this theatre of war.

CHAPTER 24

CAPTIVITY IN CHANGI

THE depression consequent on capitulation of the forces on Singapore Island, and the spiritual suffering of defeat were to a certain extent offset by the cessation of enemy bombardment which had intensified the difficulties of resisting the pressure of the enemy land troops. The mounting numbers of casualties imposed increasing stress on the medical services, and during the later days of the battle for Singapore some units were combined in order to conserve staffs. It has been already pointed out that the two field ambulances ran a combined M.D.S. and a combined A.D.S., and near their final location in St. Andrew's Cathedral and the neighbouring Adelphi Hotel were accommodated the motor ambulance convoys, the advanced depot medical stores and the field hygiene section. The 2/10th A.G.H. and the convalescent depot during the last phase of the battle were located in the Cathay building. Though the movement to these new combined areas involved toil and some risk, it enabled more efficient service to be given. Uneasiness had been felt for the relatively isolated 2/13th A.G.H., not without cause, as it was feared that the same fate might await some of the staff and patients as befell the British Alexandra Hospital at the hands of the unpredictable Japanese.

MOVEMENT TO THE CHANGI AREA

However, the anxious period immediately following the surrender passed without special incident, and early on the following day 16th February, Brigadier Stringer informed the A.D.M.S., A.I.F. that the Japanese authorities had stated that all sick and wounded were to be removed from the Singapore area to an undisclosed destination. There were in all some 9,000 sick and wounded within the Singapore area, and orders were issued later in the day that these would be moved to concentration camps and barracks in the Changi area, over fifteen miles away in the north-eastern tip of the island. The A.I.F. moved by route march to the Selarang Barracks, Changi, on the 17th February, accompanied by the 2/9th Field Ambulance and the 3rd Advanced Depot Medical Stores. The mobile bacteriological laboratory managed to move early with its own transport and equipment and was soon able to assist in such matters as malarial diagnosis, which had been virtually impossible in the turmoil of the later days of fighting. These medical units set about establishing a camp reception station for the troops, and by noon on 19th February the experienced staff of the 2/9th Field Ambulance had a 270 bed hospital ready in one of the barrack buildings on Selarang Square.

The Japanese staff officer ordering the move set a period of seven days for the movement of patients to Selarang, and would allot only five motor ambulances for the transport of lying sick. Stringer strongly and fearlessly protested against this inadequate arrangement. This protest

produced little effect at first, but permission was eventually granted for lorries parked along the Changi road to be used. No order had been given for the method of transfer of the preliminary medical units, but the taking of field medical equipment was forbidden. Motor transport marked with red crosses was used for this purpose and encountered no interference. Fortunately all the orders of the Japanese medical directorate could not be readily enforced in these early days, and the time taken to move the patients gradually increased to nearly three weeks. During this movement the number of motor vehicles was increased, and the officially allowed ration of petrol augmented by collecting it from tanks of abandoned vehicles. Finally fifty-five ambulances were brought into use, twenty 3-ton trucks, and a car.

Certain essential stores such as dressings and drugs like anti-malarials, were distributed in small parcels among the troops, and the vehicles also carried medical supplies. Precautions were taken that no single officer or man knew the whereabouts of all supplies. In this way supplies were laid by which were found invaluable in the hard days to come. The 2/10th Field Ambulance was transferred to the 2/13th A.G.H. soon after capitulation, as this unit was greatly in need of staff. Glyn White observed from the administrative point of view that the sudden removal of all trained nurses from a large hospital during an emergency reveals the defects in nursing efficiency of the lay staff. Without doubt higher standards of performance in technical medical and surgical procedures are attained in field units, because of the greater experience obtained by their orderlies who, unlike those in hospitals, have no nurses on whom they can rely.

During the brief time available before the general transfer of forces took place, patients in hospital were sorted into national and service categories, and taken over by their own people. The 2/13th A.G.H., still outside the A.I.F. area on the island, continued work during the first week with little interference from the Japanese, and then was moved to Selarang; the increased number of vehicles available allowed the heavy equipment to be taken to the new site. It was fortunate that the Japanese guards did not check the number of vehicles used, and that they overlooked in their search some miscellaneous drugs in the boot of a car; these included sulphapyridine, emetine and atabrin. A quantity of atabrin was afterwards successfully concealed in Changi by laying the black plastic cylinders along a black picture rail in a building, where it was never noticed during the whole period. The problem of fuel supply on this movement was so satisfactorily solved, even by "milking" Japanese vehicles, that after the transfer of all British, Indian and Australian patients 350 gallons of petrol remained. A request that walking patients should be allowed to ride on top of the loaded lorries was granted, so that in the end the only patients who walked to Changi were a few from the 2/10th A.G.H. and the convalescent depot who were then quite fit to march. Moreover, instead of the 250 beds which the Japanese apparently thought sufficient for 2,600 A.I.F. patients, 1,120 hospital beds were taken, and 1,400 mattresses. In addition X-ray equipment and an alter-

nator set were moved to Changi. In all sixty-five 3-ton loads were removed. The A.I.F. movement was thus made early, and was completed on 23rd February. The British medical units began to move the next day, and were in their new sites by 2nd March. This involved the transport of some 4,000 patients and staff and ninety-seven 3-ton loads of equipment. On 3rd March three Indian general hospitals began movement; this too was successfully completed. The British were established in the Roberts Barracks and the Indians in Nee Soon.

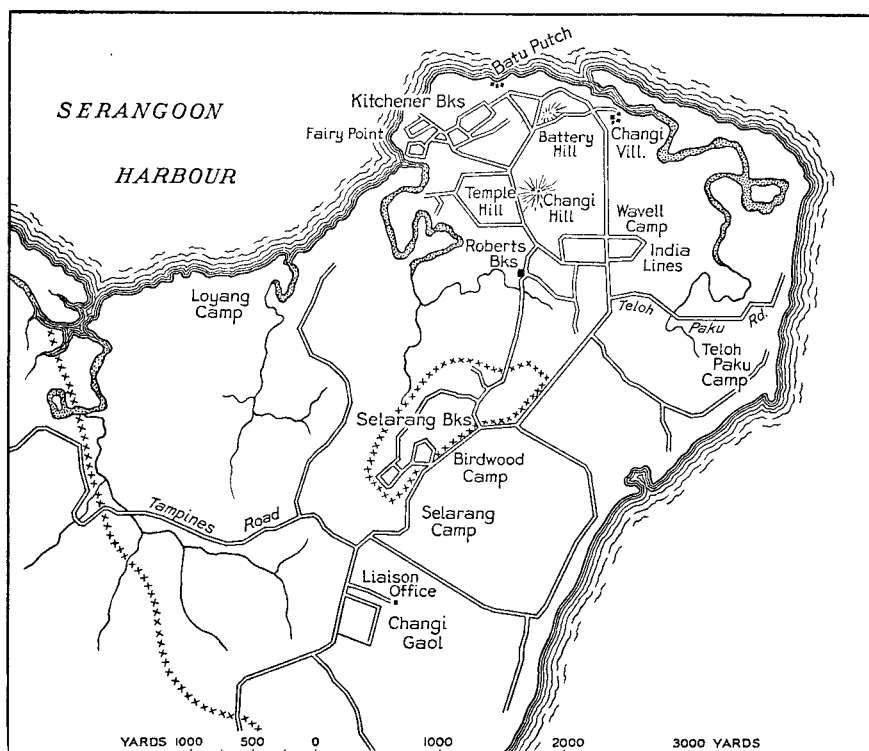
The first fifteen days after the capitulation were of great importance to the whole of the forces involved, and in particular to the medical services. The safe and humane method by which the sick were moved, and the transfer of quantities of invaluable equipment and supplies were owed to the courage and persistence of Brigadier Stringer, and Lieut-Colonel Glyn White, to the services of Major R. Dick, commander of the 2/3rd M.A.C. and his officers, and Lieutenant G. C. Middleton, transport officer of the 2/9th Field Ambulance. Their work was reflected in the high morale of the men, and their reward was the well-being of the sick and wounded.

When the A.I.F. arrived in the Changi area the strengths of the medical units were approximately as follows:

	Officers	Other Ranks	Total
2/9th Field Ambulance	15	229	244
2/10th Field Ambulance	17	246	263
2/5th Field Hygiene Section	1	19	20
2/4th C.C.S.	11	96	107
2/2nd M.A.C. Medical Wing	—	12	12
2/3rd M.A.C. Medical Wing	2	19	21
2/10th A.G.H.	30	185	215
2/13th A.G.H.	25	183	208
2/2nd Convalescent Depot	12	85	97
2nd Mobile Bacteriological Laboratory	1	5	6
3rd Advanced Depot Medical Stores	1	3	4
Total	115	1,082	1,197

The Changi Area. The Changi area at the eastern tip of Singapore Island was roughly four miles by three and a half miles in its longest diameters, and about one-third occupied a blunt promontory jutting into the Straits of Singapore. The Selarang area was roughly in the centre, on rising ground, well grassed, with palms and trees, and some rubber. At each side and in the middle the land fell away into irregular ravines. The soil was mostly sand and clay, and to the east and north-west there were swamps. Most of the ravines though not all were well drained, but after rain the subsoil water rose rapidly, and seeped through to the surface on some of the roads and other places. There were obvious potentialities for mosquito breeding.

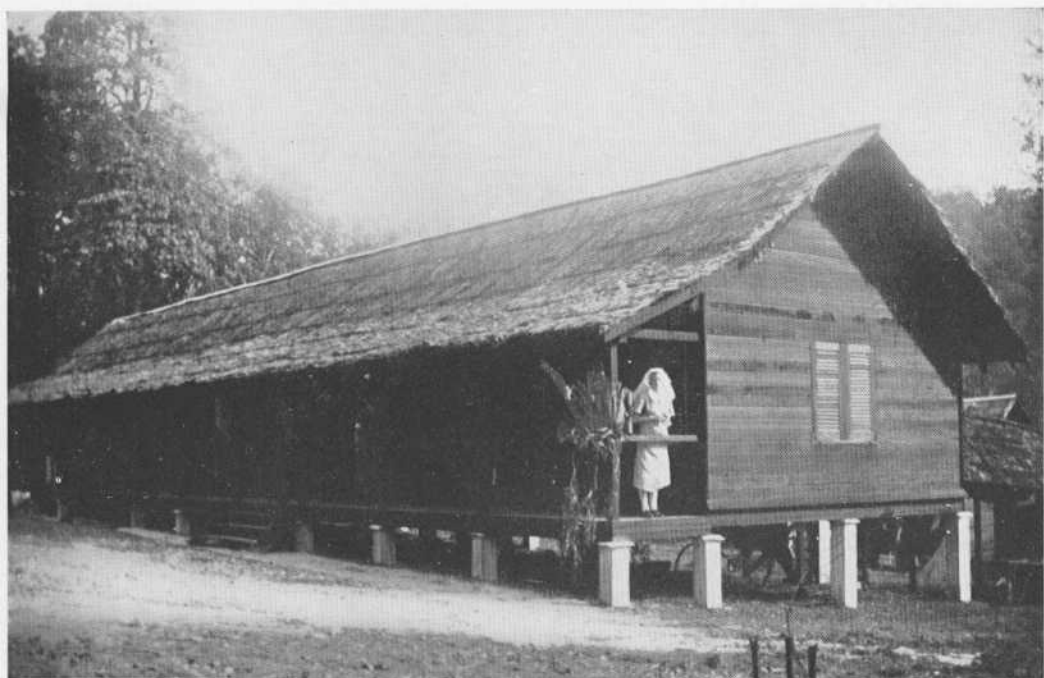
The barracks could accommodate some 5,000 to 6,000 troops without much overcrowding, but the Australians found that 15,000 men were allotted to the barracks including a hospital of 1,000 beds. There were about sixty buildings, weatherproof and in reasonable condition, but these were quite inadequate. Even with bivouac accommodation of extemporised kind some 3,000 troops could not be sheltered from the weather. One block contained eight times its normal peacetime complement. The convalescent depot was at first accommodated in the adjoining Birdwood Camp, to which the A.I.F. artillery regiments were originally allotted, but these units were also crowded into the Selarang area.



Changi Area.

Early Organisation. Within the areas occupied by prisoners of war the Japanese army left organisation of the medical services entirely to the Malaya Command, and as before, internal arrangements of the A.I.F. medical services remained the responsibility of the A.I.F. command. At first all units in the Selarang area were separate, and each had its own regimental medical officer, until the Japanese altered the arrangements.

On 22nd February 1942 Major-General Callaghan, appointed as G.O.C., A.I.F. after Major-General Gordon Bennett left, appointed Colonel Derham as A.D.M.S., A.I.F., Major B. H. Anderson as



Nurses' quarters, Camp Reception Station 2/4th Casualty
Clearing Station Malaya.

(A.A.N.S.)



A.I.F. ward in Malayan Hospital.

(Sydney Morning Herald)



The 2/4th Casualty Clearing Station, Fraser's Hill, Malaya.

(A.A.N.S.)



A.I.F. nurses returned from Singapore, March 1942.

(Argus)

D.A.D.M.S., A.I.F., and Major C. E. M. Gunther as D.A.D.H., A.I.F. The administrative headquarters now disappeared; Lieut-Colonel J. Glyn White was meanwhile engaged in the evacuation of the medical units and patients from Singapore.

During this early settling down period the brief respite of time, and better conditions of transport obtained from the Japanese were invaluable; among the wounded were many men suffering from dysentery and malaria. When the hospital patients from Singapore arrived considerable difficulties were experienced, as the Japanese refused to allow equipment to precede patients; even in their housing there was often unavoidable delay, which would have been greater had there not been a C.R.S. ready. Rations and cooking materials sometimes went astray and it was necessary to place guards over dumps of foodstuffs. Numbers of patients who were considered well enough to be independent, had to be sent to their units and told to return for treatment as out-patients. The Japanese wished to complete these moves as speedily as possible, but all delays which could possibly be interposed by various manoeuvres were much to the advantage of the British and Australians. Most of the equipment held by the 3rd Advanced Depot Medical Stores was dispersed among other medical units, but certain valuable stores were still held when the unit arrived at Selarang; these included dressings and anaesthetics.

EARLY PROBLEMS AND ACTIVITIES

The first weeks in Selarang were full of difficulties. When the Australians arrived the area was dirty and flies were breeding profusely. Dysentery was already occurring to some extent among troops from Singapore. The area was sewered, and had possessed an adequate water supply, and three sedimentation tanks. Bombing, shell-fire, sabotage and ill-judged attempts to use the sewerage system without water made it unusable. Deep trench and borehole latrines were constructed, and breeding of flies and mosquitoes was attacked. The hygiene section under Major Gunther did valuable work, particularly through N.C.Os. attached to various units for advice and help. Engineer services also cooperated in technical matters. Education of the troops themselves as usual was not simply accomplished, but lectures, and visual instruction with posters, and the influence of hygiene picquets helped to maintain hygiene discipline.

Water at first caused some anxiety, as the forces could rely on only a few shallow wells dug to supplement outlets from the subsoil drainage. Engineers quickly brought into use twenty-two water carts brought with the troops, and instituted a delivery service of drinking water. Other sources used were a swimming pool in one of the ravines, a Malay school reservoir and two underground storage tanks. This permitted a ration of half a gallon per man per day, increased to one gallon for the hospital; all water was chlorinated. Owing to shortage of petrol the carts were moved by man haulage. Later engineering development will be described in due course. The important bearing of these factors on hygiene will be obvious, for even personal cleanliness was difficult to maintain. Long

queues of dispirited men waited at points where meagre washing and bathing facilities were provided from subsoil overflows. Glyn White described the men on the morning after most of them had arrived in Selarang as follows:

Men exhausted by continuous fighting, and finally a long march to the area, dirty, unshaven, hungry, their fondest dreams shattered with nothing to look forward to—they were the men called on to dig latrines, clean up the area, to clean themselves, and to remember the principles of hygiene.

When these tired men could be rallied to help in the fight against disease dysentery had gained a foothold in the camp and a long struggle was begun for its mastery. Accommodation was severely strained, and fourteen medical inspections rooms were opened by unit medical officers, each holding ten men. These rooms were found most useful, they were of course used only for men with mild illnesses. All patients with dysentery were concentrated in one building and cared for by the 2/13th A.G.H. Washing of patients, linen and utensils raised great problems: the carriage of all water by hand from a source down a valley 200 yards away imposed hardship on the staff. Dressings and sterilisation of instruments caused similar difficulties. Most of the wounds became infected, and profuse suppuration was common: many were fly blown. Weight loss was often extreme in badly wounded men, and gross suppuration, added to deficiency of protein in the diet, increased bodily wasting. An operating theatre and X-ray room were set up in another block, and were the responsibility of the 2/10th A.G.H. staff. As the buildings were of three stories it will be seen that food distribution from outside cookhouses was a laborious procedure. It cannot be said that complete cooperation was always given to the medical services by combatant units, whose members did not understand that their unhappy circumstances increased their personal responsibilities in the fight against disease, which knows no discrimination. Once more greater efficiency was found in self-reliant field units than in the more dependent base units, with their lesser opportunities for gaining knowledge of technical procedures.

Move to Roberts Barracks. It was just at this stage, when the organisation was beginning to run smoothly that the Japanese authorities on 6th March ordered that all sick men in the Changi area were to be concentrated in a central hospital in Roberts Barracks, where the British hospital already occupied some buildings. At a conference with the D.D.M.S. of Malaya Command the A.I.F. medical administrators learnt that this move had to be completed within seven days, and that one hospital was to be founded under unified command. It was at once evident to the Australians that this order could cause administrative difficulties, being contrary to the agreed policy of the A.I.F., that as far as possible Australians should be treated in Australian hospitals under independent administration. At this conference it was decided that the Australian hospitals should set up a single unit at the Roberts Barracks or an Australian section of a combined British and Australian general hospital. Lieut-Colonel J. W. Craven was

appointed to command the hospital area: hygiene and sanitation were administered by Malaya Command. The A.D.M.S., A.I.F., after a further conference with commanders and quartermasters of A.I.F. medical units appointed Colonel D. C. Pigdon of the 2/13th A.G.H. to command the Australian section, with Major A. R. Home of the 2/13th A.G.H. as registrar and Captain E. N. Lee of the 2/4th C.C.S. as quartermaster. Colonel E. R. White of the 2/10th A.G.H. relinquished command for such period as the hospitals remained combined, and acted as organiser of post-graduate medical courses. The staffs of the field ambulances reinforced the staff of the combined hospital, and the 2/4th C.C.S. and 2/3rd M.A.C. moved to the Roberts Barracks with the other units. The D.A.D.M.S. of the hospital area was responsible for the distribution of the pooled ordnance equipment. To lessen strain on the hospital the 2/9th Field Ambulance maintained an out-patient service with special clinics attached.

The move was completed by 11th March 1942 with 3-ton trucks and man-powered trailers supplied by a transport company engaged in work for the Japanese. The patients were of the following categories: surgical 351, dysentery 283, malaria 80, typhus 32 and other medical 176.

In the Roberts Barracks hospital the conditions were described by Brigadier Stringer as appalling. There was gross overcrowding. Each ward held 144 men in the space designed for 60; there was no running water, no arrangements existed for sterilisation, nor was there any lighting except one extemporised oil lamp on each floor, and the sanitation was primitive. Even the dysentery ward had only two or three bed pans. Feeding utensils were few, and there were not enough bed clothes: sometimes patients had to remain on the stretchers. But even in these meagre conditions, with only six orderlies for 144 patients, Pigdon endeavoured to maintain a good standard of nursing, and insisted on regular instruction of orderlies. In this way a nucleus of men with practical training was built up and proved of great value later.

Administrative difficulties. As was expected, administrative difficulties arose. The difference in record systems alone made a separation of the hospital sections necessary: the same applied to pay, rations and discipline. By 24th March there were 2,600 patients in the combined hospital, and a vast amount was still to be done to ensure efficiency. Stringer suggested that Glyn White should fill a position corresponding to that of Lieut-Colonel Neal, I.M.S., in the hospital, with respective control of Australian and British sections, and both acting under Colonel Craven the commander. Derham, however, pointed out that it was more useful to all parties for Glyn White to act as D.A.D.M.S., A.I.F. for the hospital area, since the sectional commander naturally looked to the A.I.F. headquarters which was already responsible for all his needs. This arrangement was adopted, but it did not work well in all ways, as the system of divided control made it very difficult to obtain outside help and cooperation in matters of construction or alteration.

Difficulties arose too with the allotment of buildings; independence of tenure was not practicable, and complete pooling of stores was undesirable. By the end of April General Callaghan thought that the whole question should be re-opened, since the experience of two months showed that the arrangement did not work satisfactorily. In effect, the A.I.F. command held that an outward appearance of conformity to the Japanese order for a combined hospital was all that was necessary, and that the Australian general hospital should retain independent identity with responsibility to its own command. Stringer, in reply, held that all matters of difference were minor, and that the general good was to be aimed at, regardless whether it affected British or Australians. Friendly conferences were held between the parties, and it was agreed that without doubt the Japanese looked to the D.D.M.S. Malaya Command as the responsible medical authority. It was recognised too that the cause of economy would not be served by sundering the overall control of the combined hospital. The A.I.F. officers still felt the difficulty of serving two masters, and could not relinquish their basic responsibility to their own administration. Derham suggested that if these broad principles were accepted there was no reason why future difficulties could not be adjusted in the spirit of cooperation and friendship. Difficulties did recur, such as those of accommodation, and adjustments of amenities pay within the hospital, but these were settled. It was agreed too that if moves were contemplated, this would be by policy of the command and fully discussed with A.I.F. headquarters. Intermittent discussion of difficult points continued until a stable arrangement was reached.

Conditions in the Changi area. During the early months of life in the Changi area an orderly military life was maintained. Movements of troops in and out of Changi had been going on for some time: these will be described presently. For a time at least the senior officers were permitted to be with their men and to encourage the cohesion of a united force.

General Percival was in charge of Malaya Command, which controlled four formations, one being the A.I.F.; each of these had a distinct enclosed area. This command received all orders from the Japanese command. Major-General Callaghan maintained a normal headquarters staff for the administration of the A.I.F. War diaries were kept by units with the usual administrative records, and were later buried in sealed containers in a safe place whence they were finally recovered. Training was continued as far as possible, discipline was maintained and several ceremonial parades were held. Technical courses and education classes were begun, entertainments were given by various units, and a concert party was formed. Officers' rank badges were removed by order of the Japanese, and a single star on the left breast was worn by all officers. Rations will be described in a separate section. Red Cross amenities were to some extent available at first but the Japanese were not cooperative, and would not allow International Red Cross representatives to visit the camps. Three truck loads of rescued Red Cross stores were taken to Changi with

the equipment of the hospitals, and some supplements purchased, but in April the Japanese refused to allow the Red Cross representative to go to Singapore except with special authority. Little of value could be bought, and that mostly by stealth from a Chinese outside the camp area. Arrangements for mail were made, but again the Japanese were not cooperative. During June 1942, postcards for home were written by all prisoners of war, but over the whole war period an average of only one letter per man per year reached Australia.

The Question of Repatriation

In April 1942 Malaya Command raised the question of repatriation of medical and surgical patients who would not be able to serve again in the war. Stringer asked the medical authorities of the other commands to prepare such lists for submission to the representatives of the Japanese Army. A list of 129 patients from the A.I.F. suitable for repatriation was sent to Stringer who made application through Malaya Command on 11th May 1942. In June a further request was proposed by three senior medical officers, that in addition to medical personnel who would be sent with repatriated sick and wounded, if their return was approved, members of the medical services should also be returned who were surplus to local requirements. They pointed out that there were two fully staffed hospitals with a virtual excess of specialists. They further considered that personal application was in order on this matter, in view of the fact that Britain and Australia had both been signatories on 27th July 1929 at Geneva to an International Convention for the amelioration of the condition of the wounded and sick by armies in the field. However, Derham pointed out that from the legal point of view the application was invalid, since Japan would not ratify the Convention relating to treatment of prisoners of war. He further thought that under the peculiar conditions of Malaya it was doubtful if there would be surplus medical personnel, and likewise doubted the wisdom of the proposal. A conference was held with representatives of A.I.F. Command in Malaya; it was pointed out by Colonel W. S. Kent Hughes representing the A.I.F. commander, that examination of the probable requirements of medical staff in the event of extension of the sickness rate showed that there would not be a surplus, rather a deficit. The A.I.F. commander therefore reached the conclusion that the correct action was to continue to importune for the return of invalids, but this request was not granted by the Japanese. Stringer finally pointed out that he had petitioned the Japanese in various ways to secure this humanitarian measure, but feelingly admitted complete failure.

SENIOR OFFICERS SENT TO JAPAN

In anticipation of his departure with other senior officers from Singapore the G.O.C., A.I.F. in Malaya on 21st July 1942, appointed Lieut-Colonel F. G. Galleghan to administer command and to assume command after he had left the area. All officers over the rank of lieutenant-colonel were included in the party which left for Japan on the 16th August. This move

followed the expected action by which the senior administrative officers are taken from their men when they are in the hands of the enemy. The A.I.F. medical personnel included in this Japan party were Colonels A. P. Derham, E. R. White and D. C. Pigdon, Captains D. J. Brennan and P. N. O'Donnell acting as R.M.Os. and eight other ranks. General administration was in no essential altered. A firm combined front was presented to the Japanese in all joint matters, while the A.I.F. command continued to keep its autonomy in matters of individual significance which did not affect Japanese administration over the camps as a whole. Good relations and full cooperation were maintained between Malaya Command and the A.I.F. command. This applied also to the medical corps. When Brigadier Stringer left Changi Lieut-Colonel W. L. Neal took over the duties of D.D.M.S. of the Malaya Command. Lieut-Colonel H. F. Summons was at first appointed as A.D.M.S., A.I.F. and to command the A.G.H., but after discussion with Lieut-Colonel Galleghan he remained S.M.O., A.I.F. and commanded the A.G.H. in the Roberts Hospital, while Lieut-Colonel J. Glyn White carried on the duties of the A.D.M.S., A.I.F.

Changes in hospital administration. The changes incident upon the departure of the senior officers re-opened the problems of the combined hospital in Roberts Barracks, where difficulties still existed in some important details of administration. A conference was called by Neal and at this a clear understanding was reached and ratified. This provided that the commander of the Changi hospital area should allot accommodation between the British and Australian sections and that British and Australian sections of the hospital draw their own rations, and be responsible for accounting to the Malaya headquarters, except for supplementary items, for which the commanders of each section were responsible to their own headquarters. The A.G.H. dealt only with A.I.F. in the matter of clothing, but all other "Q" matters were adjusted through Malaya Command, and engineering services were a responsibility of the British command unless Australian help was required. This arrangement proved much more satisfactory, and maintained the independence of the A.I.F. medical services in essential respects.

This period marked the close of an epoch. The statement that general administration went on as before indicates that the tradition of leadership was handed on. Some of the anxieties immediately incident on the capitulation were blunted, but the dazed incredulity of a new and unreal life was replaced by a perception of the future as an incessant struggle; a struggle against illness, disease and death, against hunger and the weakness of malnutrition, and against both crude and subtle yet endless attacks on morale. The pettiness and unreasonableness of restrictions and irritating regulations, the saluting of Japanese and Indian guards, the harshness even amounting to brutality, these were trials which had to be borne without loss of spirit. On the administrative officers fell the endless and too often fruitless task of protesting against privations and injustice, in

an effort to better the conditions of the men. This moral fight against the Japanese was well exemplified in the incident now to be described.

THE SELARANG BARRACK SQUARE INCIDENT

On 30th August 1942 all area commanders were ordered to meet Japanese representatives because of attempts to escape by the men in the Changi area. The matter had been brought to a head by the capture of two British and two Australian soldiers who had been trying to escape. The A.I.F. men were recaptured on Banka Island and were very ill when brought back to Changi. A demand was then made that all troops should sign the following undertaking:

I, the undersigned, hereby solemnly swear on my honour that I will not, under any circumstances, attempt to escape.

All the area commanders refused this on principle. On 1st September the Japanese army representatives informed Colonel Holmes, administering Malaya Command, that all who refused to sign this undertaking would be subjected to "measures of severity" and would be transferred to a smaller area. Not long after midnight orders were received by Malaya Command for all British and Australian forces in the area to be moved to the Selarang Barrack Square. As all troops in the Changi area had been given the opportunity to sign and all had refused, arrangements were made for the transfer. The A.I.F. command agreed entirely with the decision to refuse signature.

The barracks square concentration area had an overall size of 800 x 400 feet; on this were seven barrack blocks each of three floors, each of which had a total floor space of 150 x 60 feet. In this area were to be confined 13,350 British and 2,050 Australian troops, a total of 15,400. The combined hospital remained at Roberts Barracks, and the Australian convalescent depot which was at Selarang, held 235 convalescents out of a total of 331 men. Of these 104 were unfit for any duty and 78 had a limb amputated or were severely incapacitated.

It was evident that the most important problems concerned in the herding of so many men into so restricted an area were medical. At A.I.F. headquarters arrangements were made for the shifting of stores of different kinds, and in particular for the provision of adequate hygiene, which was non-existent. Organisation for the move began at 4 a.m., and by 9 a.m. the necessary work of making trench and bore-hole latrines on the tarred barrack square began. There were only three water points in the whole area. At first it was thought that kitchens placed off the road could be used, but the Japanese insisted that they should be brought within the area. In the afternoon of 2nd September the four soldiers who had tried to escape were executed by the Japanese; all formation commanders were required to witness the execution.

By evening all details of the move to Selarang were completed. The troops had taken rations with them, but none had been received from the Japanese for two days. The presence of the convalescent depot was

helpful, as this unit had received 360 lbs. of meat and a large quantity of vegetables from a working party which drew supplies from other areas on Singapore Island. This was very useful for feeding the convalescents, who represented some 70 per cent of men in Changi. The A.I.F. commander congratulated the troops on their excellent spirit, and advised them not to show resentment, and to refrain from any provocative acts and in particular not to attempt to escape, which could only lead to reprisals. That evening Lieut-Colonel Okayama addressed all senior officers and advised them to persuade their men to sign the undertaking, but the British commander asked permission to explain in writing their point of view.

On 3rd September the priority of sanitation projects was recognised as paramount. The area available to each man was less than 4 square yards, much of which was taken up by kitchens, and shelters, and would be daily encroached on by latrines. The A.I.F. had the task of digging six pits 16 feet deep and two pits 6 feet deep in the square, which was already densely crowded. Water was rationed to a gallon a day. At a further conference the Japanese commander ordered the troops to sign the form, under the threat of having their rations halved. A party sent to collect rations was warned that the ration would be cut to one-third. The position was now becoming more serious. Temporary accommodation for sick was provided, and sick parades were held, but the Japanese would allow only patients with dysentery or diphtheria to be sent to the Roberts Hospital. Colonel Neal expected that 400 cases of illness would occur within the next few days, and up to 1,000 in the next week, whereas the general hospital could take only 300 more patients. Dysentery and diphtheria were already occurring. The A.I.F. commander placed the joint views of all commanders before his senior officers, advising them to sign the declaration under duress, recognising that it was the duty of the whole force to stand united, and to conserve itself as a force instead of exposing the men to serious losses by illness. The officers were in entire agreement with this decision, the men were in good spirit, and that evening the A.I.F. concert party gave a performance in the square.

On the 4th, efforts were made to induce the Japanese to accept a compromise declaration admitting duress. The Japanese refused amendments, but eventually agreed to replace the original order for concentration by one demanding signature of the declaration. This face-saving manoeuvre of the Japanese was regarded by the British force as a moral victory. Galleghan addressed his troops, and in congratulating them on their firm stand and admirable A.I.F. spirit, advised them to sign. This decision was reinforced by the medical appreciation of the situation made by Glyn White earlier in the day. He pointed out the dangerous sanitary position, the meagre water supply, allowing them no washing of clothes and limited ablutions, and the risk of infections arising in the cramped cookhouses. Review of hospital admissions since capitulation was far from good, and evidence of nutritional deficiency diseases were appearing. Diphtheria was increasing, and already some 300 contacts were in the

area. In a few days he expected serious epidemics to begin, with a high accompanying mortality: medical supplies would be exhausted in ten days, and Roberts Hospital would soon be unable to cope with admissions.

On 5th September all forms of declaration were completed, and by direction of Galleghan the force, when allowed to resume its previous location moved as a disciplined body, showing neither enthusiasm nor resentment. Arrangements were made to clean up the area and to take all precautions against the spreading of infection. So ended an episode which consolidated the force in resolve and amity, and enabled Colonel Holmes as British commander in Changi to "look to all ranks to continue in good heart, discipline and morale".

HOSPITAL WORK

As soon as the forces moved to the Changi area both preventive and curative medicine assumed the greatest importance. The magnitude of the obvious task of the medical services, that of curing the sick was subject to more than usual fluctuations. These were owing in the first place to the number of casualties from combat and disease that represented a legacy from the Singapore battle. Next there was a rise in illness due to infective and nutritional causes, arising within the concentration area itself. This varied from time to time, partly owing to the upsurge and subsidence of ordinary prevalent or epidemic diseases, some of which was preventible. During the first few months the commonest diseases in Changi were disorders of the skin, dysentery, other digestive troubles, and to a lesser extent respiratory diseases. Typhus, and malaria mostly contracted before capitulation, were also seen in hospital, and diphtheria appeared, though in fewer numbers in the A.I.F. than in the British force. Another reason for rise and fall in illness was related to the nutrition of the men; malnutrition was a constant menace throughout the whole force, and varied in degree with the ration supplied and the supplements that could be procured or devised. Finally the amount and to some extent the type of illness occurring in Changi depended upon the military population itself, which fluctuated considerably. In March the Japanese began to send out working parties into different parts of Singapore Island and the neighbouring mainland, and in May a series of oversea and up-country working forces was sent away. These varied in size from small parties to large forces of several thousand. Some returned after a time; others, bound for more distant destinations, found terminals elsewhere and never returned. Their coming and going, and for a time also, the arrival of parties from the Netherlands East Indies where they had been taken prisoner, not only produced temporary swings in the local population, but also caused variations in the local sick rates.

In order to lessen the strain on the A.G.H. medical attention outside the hospital wards was well organised. When the A.G.H. moved to the Roberts Barracks the 2/9th Field Ambulance set up a classification centre, and thus controlled the admission of patients to hospital. The movement of patients was carried out by motor ambulance, and for this service the

stocks of fuel obtained during the move to Selarang were invaluable, since none was supplied by the Japanese till June. Even then supplies were fitful and meagre. All fuel was scarce; it could not be spared even for lighting the hospital wards at night and to make medical attention possible after dark poor substitutes such as malariol were sometimes used in lamps, for there was no other source of light. Economy in the routine use of motor fuel in ambulances was so pressing that man-drawn trailers were sometimes used, and as far as possible patients were not discharged from hospital unless they could walk reasonably well. Medical inspection rooms were found valuable. Their number depended on the number of troops in the area, and during the early period before working parties moved off, the provision of twelve to fifteen beds for cases of mild illness was most helpful. Later they became aid posts, and when the prophylactic treatment of deficiency disease was organised, these posts served a useful purpose in distributing yeast, "marmite" or rice polishings. So as to distribute work and experience evenly among the medical officers, especially when they were liable to movement with the working parties, officers working in aid posts were exchanged with others in the hospital.

From these activities developed out-patient clinics at which A.I.F. troops were treated, and also from time to time, British and Dutch troops quartered in the area. A surgical clinic under the care of a succession of medical officers attended men with minor disabilities, and here too minor operations were performed. A number of special clinics were also formed, not all at the same time, but in response to particular needs. Clinics for the diagnosis and treatment of special diseases included ear, nose and throat, eye and skin departments.

Preventive Medicine in Changi. The early start of practical hygiene in the Changi area has been already mentioned; Major C. E. M. Gunther, with previous tropical experience, was well equipped to set and maintain a high level of work. Much labour and time were saved by the adoption of standard methods suited to the circumstances. The success of measures adopted during the few anxious days of the Selarang Barrack incident showed the value of standardisation. All hygiene work was carried out under the supervision of members of the field hygiene section, and regularly inspected by the D.A.D.H. and A.D.M.S. of the A.I.F.

The most important measures were those directed to the control of dysentery and similar diseases and of malaria. Lieut-Colonel J. H. Strahan, R.A.M.C. commander of the 6th British Malaria Field Laboratory, directed the anti-malarial work, which began within the perimeter. Many bomb craters were filled, and the areas oiled where water collected in marshy ground and in seepages. In April the Japanese permitted working squads to go beyond the barbed wire, and A.I.F. troops filled in craters, cut drains and oiled all possible breeding places for a belt over three-quarters of a mile around the A.I.F. perimeter. Gunther reported at this stage that within the camp there was no evidence of breeding of

Anopheles maculatus, the significant vector, but that outside the wire there was at least one dangerous area.

Instructions were circulated to all medical officers concerning treatment, which was with quinine and plasmoquine for primary cases and atabrin for relapses. Atabrin was recommended for suppression for all patients with relapses or showing debility; the dosage was 0.2 gramme, two days a week for three months. This recommendation was made by a sub-committee on malaria appointed by the A.D.M.S. Five months later the Civil Health Department was reconstituted and took over this outside work, and for over six months maintained this work with coolie labour. A certain amount of work inside the perimeter was also undertaken, and while this was done the malaria rate was kept at a reasonably low level. Up to early in April only seven primary cases had occurred in Changi.

Water supply received much attention from the engineering services. A great improvement resulted when underground tanks were linked with low pressure mains from Singapore, and lines were laid which enabled water to be pumped to points where it was to hand for cooking or drinking. Towards the close of 1942 the engineers brought the high pressure system into use, and by intermittent pumping managed to assure an adequate supply through the pipe-lines. Water was delivered by water carts; that used for drinking was chlorinated, but not that used for cooking. For ablution hand pump showers were constructed in which subsoil water was used. Chlorination was no longer necessary in the A.I.F. area when the Singapore water supply was first restored, but daily tests were carried out to ensure purity of the water. However, in November 1942 the supply of chemicals used for mass purification in Singapore failed, and chlorination for drinking water was resumed.

Sanitation, as has been already described, was perforce achieved by the construction of latrines. When the water supply was improved late in 1942 it was planned to restore the water sewerage system, but technicians capable of carrying out the work were not available, and the project was deferred. Its further developments belong to a later period.

Medical conditions. Of the 571 patients in medical wards on 10th March 283 had dysentery, 80 malaria and 32 typhus. Malaria patients fluctuated in numbers between 50 and 100 for a time, but the numbers declined during the year, as precautions improved. While this applied to the patients from the Changi area others were seen from other camps where the facilities for prevention were often limited. One man died from blackwater fever, the first malarial death in two years.

Dysentery infections rapidly increased in numbers, which reached 469 at its peak on 22nd March. This was proved to be due to a true epidemic incidence, for the numbers lessened again and by the early days of April had fallen to 169. This resulted from improvements in local hygiene, and nursing care given under very difficult conditions must also be given credit. The death rate in this epidemic was 0.8 per cent: three of the deaths occurred in one small severe series. Chronic states were seen in

some men, but special dietetic care and thorough observation by regular sigmoidoscopy by Major Hunt saved many patients from prolonged illness; microscopic proof was necessary before treatment of amoebic infections was begun because emetine was very scarce. Later when more supplies arrived greater latitude was possible. Stovarsol was later available too and gave good results. The treatment of bacillary dysentery at first depended chiefly on general measures, but in October a small supply of sulphaguanidine arrived. This could be used for only about twenty severely ill men; the results were very satisfactory. It was observed that some of the Dutch arriving from Java suffered from a severe type of dysentery; in fact, another epidemic wave occurred, though the rate among the A.I.F. remained low.

Dengue fever had already been experienced in the force during 1941, when an epidemic occurred; this was repeated in 1942. Sporadic cases appeared early in the year and by May an epidemic was in full force, characterised by well marked rashes. The peak was reached in July, after which it rapidly subsided.

Diphtheria needed some care, especially when of the cutaneous type, which was sometimes associated with other conditions, such as scrotal dermatitis. Over 100 cases of all varieties were seen, with two deaths. Antitoxic serum was very scarce and hard to get. Peripheral neuritis was a not uncommon sequel, but no other complications were seen. British and Australian patients were isolated together. No search was made for carriers for no measures of value could have been taken had they been found. The so-called benign lymphocytic meningitis appeared in small numbers, but three deaths among twelve patients occurred in a period of a few months.

NUTRITION

Deficiency diseases were always present and measures were taken to investigate their nature and onset. Alimentary disease was not common. Functional dyspepsias related to stress were not seen, but peptic ulcer became steadily more frequent. During the early phase of concentration at Changi five cases of ruptured peptic ulcer were seen; all these men recovered after operation. The difficulties of treating peptic ulcer in so unfavourable an environment will be evident. It is interesting that the occurrence of what the patients described as "black-outs" replaced the older symptoms of neuro-circulatory asthenia as seen in 1914-1918. The same was observed in the Middle East. Respiratory diseases became more frequent, including bronchitis and asthma. No pulmonary tuberculosis was seen in 1942: the first case came to light in January 1943. Skin disease provided a good deal of work. Some severe toxic dermatoses appeared, and environmental factors were also responsible for some skin disturbances, rendering some men unfit for prolonged exposure to the sun. Tinea was also troublesome. Mental disease was rare; only seven cases occurred: one man died of organic nervous disease, *pachymeningitis haemorrhagica interna*, five others were returned to their units.

In March 1942 the G.O.C. Malaya warned the representatives of the Japanese Army that a balanced and sufficient diet was essential, especially if the men were required to work. He pointed out that the inadequacy of the Japanese ration was proved in the Russo-Japanese war, and requested that supplements be issued. Burgess and others informed Stringer that the substances required were rice polishings, ground nuts, soya bean, dhall and yeast. Rice polishings had the drawback of becoming rancid after prolonged keeping, and brewer's yeast might present difficulties in manufacture. Baker's yeast had only one-tenth of the vitamin value of brewer's yeast, a quarter ounce of which in the dried form would supply a man's daily needs. Fat was obtainable as a vegetable oil, such as red palm oil or oil from ground nuts, which had other nutritive value in addition. Green leaves could supply vitamins *A* and *C*, if given in quantities of 2 ounces daily.

From April onwards energetic steps were taken to provide supplementary vitamins for the diet. The first case of beriberi was officially notified on 20th April, but before this date two sudden deaths had occurred from cardiac failure of obscure origin. On 28th April a third occurred and no doubt was then entertained as to the cause. This sudden cardiac death was known to the Japanese as *shoshin*, and was regarded as a manifestation of cardiac beriberi. Whether this retrospective diagnosis was justified or not might be questioned, since no further deaths occurred in this series, though similar cases were encountered later usually under much worse circumstances. It was certainly significant that two of the subjects were men in their third decade of life, apparently in good health. Clinical beriberi was recognised in its more familiar forms during the next few months, followed by scrotal dermatitis, glossitis and stomatitis, painful feet, spastic paralysis, granular cornea, and amblyopia. By the end of 1942 all these varieties of deficiency disease impressed their clinical syndromes on the medical officers in Changi.

After the appointment of a research officer to the A.I.F., Captain Woodruff, a standard method of record was adopted. A scheme of classification was drawn up as follows:

- | | |
|----------------------------|-----------------------------------|
| A Burning hands | (b) glossitis |
| B Painful feet | (c) lesions of buccal mucosa |
| C1 Encephalopathy | (d) palatal erythema |
| C2 Spastic paraplegia | F1 Scrotal dermatitis |
| C3 Peripheral neuritis | F2 Pellagroid lesions of the skin |
| D1 Cardiac beriberi | F3 Tropical ulcers |
| D2 Nutritional oedema | G1 Keratitis |
| E Stomatitis and glossitis | G2 Deficiency amblyopia |
| (a) angular glossitis | |

In addition to the presenting signs detailed above it was necessary for investigation to show that the condition was due at least in part to dietetic deficiency of some kind. It will be observed that the classification had an anatomical basis and aimed at avoiding assumptions as to the cause of

the lesions. Chronological numbers were allotted on the basis of date of admission or date of onset if known. All other usual details were recorded for each patient. The method permitted a reasonably accurate statistical analysis, though there were the usual drawbacks, such as lack of relevant detail in the history and record. A special *pro forma* was adopted in place of the usual I 1220. A follow-up clinic was also instituted.

Some interesting conclusions were reached. Battle injuries, malaria and dysentery did not appear to predispose to deficiency disease. Certain states showed grouping, such as the beriberi group, and the syndromes believed to be related to deficiency of the vitamin *B2* complex. There was a significant association between peripheral neuritis, "nutritional oedema" and cardiac beriberi. Few conclusions could be reached about duration, by reason of the impossibility of determining completeness of cure in some syndromes particularly those affecting the nervous system. For the present it is sufficient to indicate the approach to the problem which laid emphasis on prevention and cure, but also strove to observe due economy with precious materials. As in every area where significant malnutrition became manifest the clinical features were studied with great care and full accounts were written and hidden until the day of liberation.

Ration Scales. Food was the dominant consideration in the maintenance of health and strength of body in the Changi area. Fortunately a number of experts on nutrition were with the British and Australian forces, assuring the ready availability of a great amount of information concerning the dietary aspects of life in Malaya, and the nutritional value of local foodstuffs. The medical services in Changi also possessed a sufficiency of scientific and medical literature on malnutrition, which was of great value. For example one article in a Malayan journal was illuminating, as it described the clinical syndromes observed locally. The medical units included in their staffs a number of highly trained physicians who were interested in nutritional disease, even though they had not had previous opportunity of witnessing the mass effects of malnutrition on a population; they devoted continual study to these aspects, and in particular to the epidemic incidence of specific clinical syndromes. In the first few days at Changi all foodstuffs except medical comforts were pooled. The ration issue consisted chiefly of tinned meat or herrings, condensed milk and biscuits. After this early period more regular rationing was arranged, and the necessary supplementation of the insufficient rations provided by the Japanese became an individual problem for the respective components of the force.

A committee on rations was appointed for the A.I.F. on 1st March 1942. This committee reported that at that stage the food supply received from the Japanese which then contained no meat, was deficient in protein and fat and yielded only 2,050 Calories. The Army Service Corps then held limited stocks of tinned meat, and a small quantity of tinned fruit and jam.

The standard ration scale approved by the Japanese yielded 2,296 Calories, made up of 462 grammes of carbohydrates, (derived chiefly from rice), 66 grammes of protein and 20 grammes of fat. The Australian Army ration gave 488 grammes of carbohydrates, 175 grammes of protein, and 170 grammes of fat, totalling 4,220 Calories.

The committee pointed out that in order to maintain health and permit a reasonable amount of work, a diet of 2,800 to 3,000 Calories was necessary. At the time there was no certainty that the amounts and proportions of foods laid down even in the Japanese scale were actually being supplied. Doubt was further felt whether the quantity of protein in this scale would be supplied. The committee recommended that honey and golden syrup be supplied to help the men to eat their rice, and also dried fruits and meat extracts. Changes occurred in this official scale from time to time, usually in the direction of increasing meagreness.

During these early weeks of captivity, the technical advisers on nutrition to the British force were also active, and Strahan, Burgess and others drew up statements for transmission to the Japanese by the D.D.M.S., setting forth the grave deficiencies of the diet and urging that supplements be made to ensure basic requirements. Before Brigadier Stringer left for Japan he appointed a nutritional advisory committee, which contained an Australian representative, but long before this the influence of its members was felt. Burgess of the British 1st Malaria Field Laboratory was particularly helpful to the A.I.F. medical services: his experience and knowledge in nutrition were always freely available. On 10th March Derham drew up a statement on the Japanese dietary and sent this to the D.D.M.S. and G.O.C. of Malaya Command. He emphasised the need for adding at least 50 grammes of protein per day to the ration, and pointed out that deficiency disease would attack and seriously affect the forces unless an adequate ration was provided. Lieut-Colonels W. C. B. Harvey and W. A. Bye, Major Bruce Hunt and officers of the medical division of the combined hospital also drew up detailed statements of the basic requirements of a diet, with particulars of the sources and functions of the chief constituents. From the very first the great risk of serious malnutrition was clearly realised by the medical services in Changi, and close study was made by the physicians of the initial signs of dietary disorders as well as the developed clinical syndromes. The forecast was made that unless substantial appropriate additions were made serious manifestations of deficiency diseases would quickly appear, beginning with beriberi, owing to the limited capacity of the body to store thiamin. The importance of avoiding an excess of carbohydrate in relation to thiamin in a dietary was realised by the dietetic and medical advisers of the force. Some of the "eat your rice" campaigns went too far in the other direction, and Glyn White recognised from the administrative angle the importance of not increasing the carbohydrate unduly when thiamin was seriously lacking. The early onset of the thiamin and riboflavin groups of deficiency was expected; only too soon was this prophecy fulfilled. At this stage it is interesting to compare the nutritional value of the rations actually supplied

1. TABLE OF FOOD ITEMS ACTUALLY SUPPLIED BY THE JAPANESE

	Carbohydrate	Protein	Fat	Calories		Minerals		Vitamins					
						Calcium	Phosphorus	Vit. A	Vit. B ₁	Vit. C	Riboflavin	Nicotinic	Thiamin
						gms	gms	I. Units	Micro gms	Milli gms	Milli gms	Milli gms	N.F.C. Ratio
Normal Requirements	gms	gms	gms	Total	N.F.C.	gms	gms	I. Units	Micro gms	Milli gms	Milli gms	Milli gms	Should be over .3
		100	100	3400		.75	.75	3000	1000	30	1.5-1.8	15	
1942													
March	418	49	21	2119	1915	.236	1.010	3785	372.9	1.2	.769	6.0	.196
April	428	43	16	2088	1936	.162	.850	302	372.9	0.2	.694	5.78	.194
May	458	47	18	2554	2076	.127	1.002	231	564.3	2.5	.879	7.625	.273
June	460	53	22	2310	2103	.190	1.103	2324	719.4	18.7	1.191	8.23	.345
July	525	49	19	2358	2181	.156	.940	2330	504.9	17.6	1.045	7.25	.235
August	525	47	18	2519	2345	.239	1.211	2402	481.8	18.7	.924	6.69	.205
September	499	53	18	2441	2265	.227	1.146	3805	464	35.6	1.12	7.75	.205
October	445	36	21	2170	1975	.138	.724	1946	421	35.6	1.069	6.54	.213
November	432	35	23	2134	1970	.112	.630	721	392	31.7	.981	6.08	.200
December	451	35	32	2291	1997	.136	.783	817	443	39	1.092	6.19	.22
1943													
January	485	37	21	2335	2141	.235	.849	4618	492	62	.942	5.11	.23
February	478	37	23	2332	2108	.197	.825	3184	426	56	.911	5.12	.20
March	436	32	22	2120	1920	.139	.763	1209	406	54	.840	4.74	.21
April	431	33	21	2100	1907	.129	.687	917	370	50	.837	4.48	.19
May	397	31	24	1982	1758	.127	.697	1251	363	30	.640	5.150	.20
June	322	32	22	2065	1864	.137	.753	570	387	21.7	.817	4.607	.21
July	398	32	8	1834	1759	.109	.731	88	318	12	.606	4.470	.17
August	444	37	36	2311	1975	.169	.934	200	456	61	.994	5.816	.23

2. TABLE OF FOOD ITEMS ACTUALLY SUPPLIED BY A.I.F. SUPPLY DEPOT

	Carbohydrate	Protein	Fat	Calories		Minerals		Vitamins					
						Calcium	Phosphorus	Vit. A	Vit. B ₁	Vit. C	Riboflavin	Nicotinic	Thiamin
						gms	gms	I. Units	Micro gms	Milli gms	Milli gms	Milli gms	N.F.C. Ratio
Normal Requirements	gms	gms	gms	Total	N.F.C.	gms	gms	I. Units	Micro gms	Milli gms	Milli gms	Milli gms	Should be over .3
		100	100	3400		.75	.75	3000	1000	30	1.5-1.8	15	
1942													
March	418	49	21	2119	1915	.236	1.010	3785	372.9	1.2	.769	6.0	.196
April	428	43	16	2088	1936	.162	.850	302	372.9	0.2	.694	5.78	.194
May	458	47	18	2554	2076	.127	1.002	231	564.3	2.5	.879	7.625	.273
June	460	53	22	2310	2103	.190	1.103	2324	719.4	18.7	1.191	8.23	.345
July	525	49	19	2358	2181	.156	.940	2330	504.9	17.6	1.045	7.25	.235
August	525	47	18	2519	2345	.239	1.211	2402	481.8	18.7	.924	6.69	.205
September	501	57	19	2474	2289	.241	1.296	3805	618.0	35.6	1.164	10.27	.270
October	536	86	51	3030	2551	.508	1.740	3536	1221	78	2.096	21.33	.479
November	526	85	54	3024	2554	.518	1.751	2311	1343	74	2.036	24.37	.53
December	491	69	48	2771	2312	.256	1.074	1738	1206	76	1.693	19.27	.52
1943													
January	489	40	27	2413	2163	.250	.979	4618	596	63	1.078	5.82	.27
February	489	43	47	2429	2177	.262	1.335	3184	840	56	1.131	7.423	.39
March	456	49	33	2365	2068	.422	1.279	1231	1139	55	1.298	16.50	.55
April	473	58	33	2511	2177	.476	1.515	1032	1323	50	1.718	20.01	.61
May	471	85	61	2863	2277	.251	2.419	4468	1545	52	1.860	22.748	.68
June	532	103	48	3053	2590	.942	2.384	3807	1668	64	2.354	22.652	.64
July	513	95	16	2631	2486	.645	2.346	88	1346	46.8	2.276	20.698	.58
August	545	86	49	3056	2596	.864	2.192	545	1363	88	2.620	17.486	.53

3. TABLE OF INCIDENCE RATES OF MALNUTRITION

Month	Beriberi	Scrotal Dermatitis	Stomatitis Glossitis	Painful Feet	Keratitis	Retrobulbar Neuritis	Spastic Paraplegia	Pellagra
1942								
March	3	—	—	—	—	—	—	—
April	26	—	3	—	—	—	—	—
May	63	3	2	4	—	—	—	—
June	61	5	4	1	—	—	—	—
July	50	16	1	5	—	—	—	—
August	121	111	47	100	29	3	1	4
September	31	81	63	89	58	17	1	1
October	23	93	72	143	118	60	3	4
November	24	22	11	101	48	49	—	—
December	9	29	23	26	35	58	1	1
1943								
January	4	101	183	69	146	215	—	—
February	4	65	169	28	49	167	—	1
March	9	56	139	32	47	120	—	1
April	6	60	92	29	53	119	—	—
May	4	26	31	41	52	189	—	—
June	2	20	4	3	7	25	—	—
July	5	7	7	5	7	28	—	—
August	—	3	2	6	4	11	—	—

by the Japanese for the period March 1942 to August 1943, with that of the somewhat augmented diet issued by the A.I.F. supply depot.

It will be noted that the total Calories never substantially exceeded 2,500 during the period March to December 1942, and, that the thiamin/non-fat calorie ratio was almost persistently about 0.2. This last deficiency in the diet was of serious significance, as this ratio should never fall below 0.3 for minimum requirements. With this figure so constantly low, it will be seen that the men were between the dangers of a starvation ration and those of a ration perhaps containing more carbohydrate in the form of rice, but without a proportionate amount of thiamin, thus likely to precipitate beriberi. Supplements to diets were made by the various units out of regimental messing funds, which were formed from deduction of six days' pay from all ranks, the spending being judiciously done from canteens by messing officers.

Notwithstanding efforts to improve the diet, malnutrition occurred. Table No. 3 shows the order and frequency of the various clinical forms as they appeared in Changi. It will be seen that beriberi and lesions of the skin and mucous membrane due to lack of elements of the vitamin *B* complex other than thiamin soon demonstrated how poor the dietary was. It was evident that further measures were necessary in order to supply these essential elements, and thus were formed organisations for filling these needs.

On 12th August Stringer appointed a nutritional advisory committee, on which Hunt was the A.I.F. representative. This committee continued to meet at intervals throughout the period of captivity in Changi, and rendered useful service, in checking constituents of the diet, and advising as to the selection and provision of supplements. Some of the problems referred to this body were the use of rice polishings, clinical assays of green foodstuffs, such as towgay and kang kong, and the value and local production of yeast, and marmite. Attempts were made to assess the effect of certain dietary supplements on specific deficiency states, and the prophylactic value of supplements as estimated by clinical and statistical evidence. This account of the work done to combat malnutrition of course mainly concerns the A.I.F. The measures adopted by the A.I.F. and its medical services were technically similar to those adopted by the British force, for, while the Australian administration shouldered its own medical problems there was free interchange of information and opinion.

Even before the first officially notified case of dietetic deficiency state was recorded special measures were being taken to manufacture preparations rich in vitamins. Burgess produced a table setting out the estimated vitamin contents locally obtainable. Yeast and ground nut meal and leaf extracts were already being used as additions to the diet, but it was evident that these were not sufficient to make up the leeway.

MEASURES TO SUPPLEMENT DIETS

Yeast. A yeast centre was established at the end of April to produce large quantities for distributions to the troops. Large containers were

necessary and were obtained by requiring an official return of all suitable vessels from all units. Unit production was also encouraged, though this could not cope with the demand. After research two types of media were prepared, one for small scale production for seeding the cultures, the other a large scale method for bulk production. The original cultures were obtained from the Japanese, and these were continually seeded to keep them vigorous. One of the working parties on the island was able to obtain brewer's yeast direct from a brewery in Singapore, and used this for direct distribution to the members of the party and also for local production on a small scale.

Potatoes, sweet potatoes and rice were used, with the addition of sugar. Other root vegetables were also used. The use of sugar was questioned at one time, but in spite of its food value it seemed more fitting that it should be used making yeast. Gula malacca was found useful in place of ordinary sugar: this was a sort of caramel brown sugar in block form. Hops were added to the "starter" batch to prevent rapid growth of fermentative bacteria which could spoil a batch by souring and would destroy yeast cells. Accepted formulae were distributed among all parties interested. By June allocation of yeast supplies needed some revision. An allotment of 5 ounces per man was aimed at, but the A.D.M.S. desired an issue of one pint daily for each patient with beriberi; this threw considerable strain on the yeast centre. A.I.F. headquarters therefore suggested that yeast manufacture should be a responsibility of the A.A.S.C., and its distribution be made by the A.D.M.S. This obviated shortages in units unable to produce much yeast for curative purposes. The quality of the yeast was tested by cell counts carried out by Burnside's unit, the mobile bacteriological laboratory. In June only 14 out of 124 counts showed a figure over 50,000 cells per cubic millimetre. This raised the question whether it was economic to produce low grade yeast from useful foodstuffs; but only separate units were involved, as the yeast centre controlled its own counts, which were uniformly higher.

Woodruff, in charge of the yeast centre, in June was supplying 126 gallons of yeast per week; this quantity could be increased if more raw materials were available. Cell counts showed that the majority of the cells were identical with the original culture: there appeared to be other varieties of yeast also present. It was admittedly difficult to know the exact value of this yeast as a source of vitamin *B1* without being able to estimate the *B1* content. On the suggestion of the A.D.M.S. Woodruff was appointed on 9th October 1942 as A.I.F. medical research officer, in which capacity he investigated the deficiency states in Changi, with special reference to treatment. Numbers of other subjects presented themselves to various scientific workers in Changi, such as the search for a more potent wild yeast, or for methods of producing vitamin *B1* from other foodstuff, but local opportunities were too limited for most of these to bear fruit.

Rice polishings were used when obtainable, but though theoretically obtainable from the Japanese they were not always supplied. Some

samples were dirty and unpalatable: good samples were probably more effective prophylactics of B1 deficiency than yeast with a possibly low cell count. Polishings were most palatable if soaked, they were sometimes extracted, but it was generally considered that this lowered the vitamin content.

Tempe. One of the methods of making soya bean palatable and effective as a food was by preparing tempe, which was a product containing soya bean, preferably unhusked and partially predigested by fungus action. The soya was crushed and mixed with cooking oil and then cooked. Demonstrations were arranged for the method of preparation at which representatives of various units attended. The advantage of this preparation was the greater digestibility of the bean, which otherwise tends to pass through the alimentary tract undigested. By allowing a native fungus to grow on the pulverised husked beans a more palatable dish was obtained, and this method of preparation was used at the vitamin extraction centre where seed of the fungus could be obtained.

Grass or Leaf Soup. Pasture grass was limited in amount in Changi, and the coarse "lalang" grass was a poor source of riboflavin, which was the desired constituent of the extract. In Changi an extract was prepared in amounts ranging from 15 to 20 gallons a day to 80 gallons a day in later periods. The grass was used fresh, cut, and broken up and extracted in percolators. Leaves were also used, these kept better but were less palatable. Some of the native vines, like the Malayan wild passion vine, were good sources of riboflavin. Various ingenious mechanical devices were contrived to make this extract, and when electric power was available in Changi this speeded up the process considerably. Cotter Harvey obtained the services of the May and Baker representative in the Far East, and with engineering assistance and the ingenious use of various spare parts, machinery was constructed which turned out some 50 gallons of extract a day.

Gardens. The Japanese encouraged unit and group gardens, which provided all British, Australian and Dutch ranks and units with a highly valuable means of providing additional food. Seed was supplied by the Japanese and labour on a small scale was provided by the men themselves. It was not easy to maintain interest in central gardens, in which culture of vegetable foods was carried out on an extensive scale. On 5th March 1942 a scheme begun in the A.I.F. was merged in a central scheme. A garden was started outside the camp perimeter in an area of 120 acres worked and controlled by a prisoner-of-war group, but supervised by the Japanese. In anticipation of later developments it may be stated here that by October 1943, 85 acres were in production, bearing 320,000 lbs. of leaf vegetables and 90,000 lbs. of root vegetables. The produce was issued as rations by the Japanese, and helped considerably to supply certain basic needs. The struggle to maintain central gardens had to be

made, as they helped to make the men fit by supplying food, even though the local working parties were already weary from routine occupations. An elaborate scheme of urine collection for manure was organised.

Cooking. Galleghan's official report for the first half of 1942 contains special references to the ingenuity of the cooks, most of whom were not normally cooks in the army. They converted the basic ration to a much more palatable form, and helped thereby to maintain both health and morale.

Marmite. An original stock of the proprietary compound was held in Singapore where it was an army supply, and this was taken into Changi. The Japanese also held stocks obtained from the British supplies at the time of capitulation. From these sources enough could be obtained for treatment, though as the quantity was limited the distribution was carefully controlled. A substitute was manufactured, chiefly from yeast, but it was not found very effective, and was discontinued.

In dealing with the general medical and surgical activities of the medical services of the A.I.F. in Changi an account will be given of the methods by which attempts were made to record the details of deficiency diseases and to assess the value of the methods of treatment at hand. Judgment, described by Hippocrates as difficult, is no more easily made in the isolation of a poorly equipped prison than elsewhere, and, though the medical officers tried to maintain a critical mind, it was inevitable that schools of thought should sometimes differ. As we shall see, the shifting population of Changi introduced a disturbing factor in the therapeutic and prophylactic side of nutritional studies.

Hospital Dietaries. It has been pointed out already that diet available for hospital patients as received in the Changi area was inadequate. There was at the time a fair store of those extras classed as "medical comforts", but with unknown medical commitments spread over an unknown future these could not be regarded as taking the place of a sufficient daily ration. The position was made worse by the attitude of the Japanese with regard to the sick. The issue of rice was graded according to the type of work done by the men: a heavy worker was allowed 300 grammes, a light worker 250 grammes and a non-worker 200 grammes. As the sick were classed as non-workers it will be seen that men requiring a full or even a special ration to restore them to the grade of a worker were not considered at all. Under ordinary conditions it is possible to draw upon a certain floating surplus of rations in a hospital, owing to temporary inability of patients to consume the allotted portion, but when this ration approaches the starvation line there is virtually no margin. This point was often argued with the Japanese but without effect. Nevertheless a certain reserve of food was achieved through the use of the camp messing funds, from which the messing officers bought useful items through the local Japanese commander; such items were soya beans, pigeon peas, dried fish and cooking oil. To these were added Red Cross supplies when available;

one shipment arrived towards the end of 1942 and was added to the slender stores which were bought by the Red Cross representative before the prices rose to an impossible level.

Special priorities were given to hospital patients where the speed and completeness of recovery depended on having certain foods: this applied particularly to the vitamin substitutes, whether obtained as medicinal preparations or manufactured in the camp area. Frequent changes were made in the ordinary ration with regard to such items as fish, meat or grain, and shortages were very common. A special ward with a diet kitchen attached was set aside for men who had lost much weight and needed extra nutrition. This "fattening pen", as the men called it, was most successful: it was closed early in 1943 but a special kitchen for ulcer diets and other special diets was retained.

SURGICAL AND SPECIAL WORK

When the wounded arrived at Selarang the work of the 2/9th Field Ambulance in setting up two wards and an operating theatre, gave great assistance in accommodating patients under conditions of hardship and overcrowding. Three men suffered secondary haemorrhages after the movement, and required operation. Two eventually died. The next day the 2/10th A.G.H. arrived, and set up wards, a theatre and an X-ray room, but suffered the same overcrowding and were hampered by the same shortage of water, the same primitive sanitation and the same swarm of flies. The rapid increase in dysentery affected many surgical patients and many medical officers, but on 6th March the dysentery patients were transferred to special wards in the 2/13th A.G.H., until the Japanese decreed the further move to Roberts Barracks.

In the buildings at Roberts Barracks, damaged by bombing and defective in hygiene, suppurating of wounds, instead of being rare, became only too common, and maggot infestation was widespread. Gradually these conditions were controlled, and an amalgamated surgical staff was fully employed. The officers worked constantly, for they had to assist in general nursing, and supervise diets as well as all ward work, and taught the orderlies, many of whom were quite inexperienced. In both medical and surgical work the high standard attained under these trying circumstances was highly creditable to all who took part, especially when it is remembered that all skilled nursing help was suddenly removed from the hospitals before the capitulation. Equipment was adequate, but sterilisation with only one autoclave in use brought by the C.C.S. with an insufficient supply of fuel, and partly dependent on extemporised methods, was a major problem. After the first six months an electric supply was provided, and small surgical dental sterilisers could be used. The British hospital in June 1942 was able to utilise the steam from the cookhouse for operating a large autoclave; this helped greatly.

Lack of electricity forced the staff back to the use of small smoky lamps burning "dieseline" or "malariol". A combined theatre was jointly used by the staffs of the British and Australian hospitals: this was housed

in a room large enough to permit the use of two tables at each end. Only the flickering and inconstant glow of carbon lamps from a noisy diesel motor generator was available for lighting. In July a separate "clean" theatre was obtained and was used by both hospital staffs with great success. Rubber gloves soon were unobtainable, and infection seemed to be more common when they were not used. Lieut-Colonel C. H. Osborn, in charge of the surgical division of the combined A.G.H. reported that from March to 31st December 1942, 367 major and 575 minor operations were performed, a total of 942.

Prevailing sepsis and malnutrition presented serious hazards to surgical patients. Severe weight loss was often encountered, owing to the difficulty in making good the excessive loss of protein by a diet rich in this component. A ward was set apart for the subjects of chronic sepsis, with a special diet kitchen attached, and here up to forty patients were treated, the meagre stocks of reserve food available being used. Great care was taken in assuring fair distribution of this extra ration, for as soon as a patient's condition warranted it he had perforce to revert to the routine diet, chiefly rice, while others in greater need were fed. This work saved many lives.

Early in 1942 all Australian soldiers in Changi who had suffered battle injuries were reviewed. Classification was decided, and also any indications for further treatment. This review showed the following distribution of wounds:

Nerve lesions—

Upper extremity	27
Lower extremity	26
Major arterial lesions	10
Compound fractures of the femur	14
Compound fractures of the upper extremity	40
Compound fractures of the lower extremity (excluding femur)	64
Penetrating chest wounds	25
Penetrating wounds of knee joint	24

A consultation service was set up at the convalescent depot, to which the senior physician and surgeon paid weekly visits.

Artificial limbs were the subject of early study at Changi and special arrangements were made for their production. Facio-maxillary surgery was carried out chiefly by Lieut-Colonel Middleton, R.A.M.C. and Lieut-Colonel Osborn, and special instruments made locally by Private Russell and others were used. Nerve injuries were separately reviewed.

Notwithstanding the unfavourable conditions only nine patients died in 1942 in Changi as the result of wounds, and in four of these intercurrent disease was the actual cause of death.

An ophthalmic clinic was carried out at first by Major F. P. C. Claffy and later by Major R. G. Orr. The lack of electric light was an early disadvantage, but when light and power were later restored to the camp the eye work was considerably extended. This was of particular value

when amblyopia caused by malnutrition became common in the area. By the end of 1942 the number of tests of refraction was rapidly growing, and a little later three medical officers, two opticians and attendants were all busily occupied in this clinic. In April enquiry by Malaya Command showed that 33 officers and 742 other ranks claimed that they needed spectacles. The G.O.C., A.I.F. approved of the official issue of glasses only to those who needed them for the sake of efficiency or for the relief of serious discomfort. An optician in Singapore supplied spectacles under Japanese order, but after difficulties in finance arrangement was made between the A.I.F. paymaster and the Australian Red Cross Society that the society should meet the entire cost.

Ear, nose and throat diseases were looked after at first by Major A. W. Farmer, and later Major H. A. W. Watson. Infections of the upper respiratory tract were fairly common. Vasomotor rhinitis was only occasionally observed. Cases of deafness were sometimes seen believed to be due to avitaminosis. Suppurative *otitis media* was uncommon, but *otitis externa* occurred frequently, though less troublesome both in incidence and severity than during 1941.

A skin clinic was established by Captain P. N. O'Donnell, and carried on later by Major C. E. M. Gunther. Attendance reached a peak when scrotal dermatitis became common, and numbers were also increased by the high incidence of tinea of the feet, and other types of the commoner dermatoses. Scabies was rare in the A.I.F. and was seldom seen except in men transferred from other areas.

Pathology. The mobile bacteriological laboratory arrived early in Changi in its own transport, but this had to be handed over to the Japanese. Work began at once, and an investigation was begun by Major Burnside and his staff on the possibility of making a dysentery vaccine for prophylaxis. After great difficulties in standardisation and in preventing contamination under primitive conditions enough vaccine was produced to inoculate 1,000 men during April 1942.

When the combined hospital was established an A.G.H. pathological laboratory was begun under Major R. B. Maynard which was based on the pathological service of the 2/10th A.G.H. and which was joined by the pathological staff of the 2/13th A.G.H. who had managed to retain most of their equipment. There were great difficulties at first, especially with water, but after a month engineers had provided a piped supply. The laboratory moved to a new location in August. Though the 2/10th A.G.H. pathological unit had lost much of its equipment in the hurried evacuation from Oldham Hall, the combined unit was able to carry out all types of work. Material had to be conserved, as expendables could not be replaced, and fuel for purposes of heat was scarce. It was possible for subsidiary equipment to be supplied to working parties leaving Changi, though obviously this drain could not be continued indefinitely. Major Maynard and Major G. F. S. Davies were the senior members of the staff.

All urinary examinations were carried out for the wards to conserve material; all common tests of the blood chemistry and of the cerebro-spinal fluid could be done. Occult blood tests could not reliably be done as hydrogen peroxide had poor keeping qualities and other methods were unsatisfactory. Most usual forms of haematological work could be done, but investigation of local standards was necessary, as they were not identical with those acceptable under ordinary conditions. Bacteriological work was limited to some extent, but fortunately most of the cultural and typing methods for investigation of bacillary dysentery were possible.

Diphtheria was at first verified by direct smear, but as culture was found necessary, a coagulated egg medium was prepared which fortunately gave results consistent with those of the commercial Difco medium, of which the department held only a small quantity. A great amount of work was done on the preparation of a pure culture from which a toxin could be made for immunisation. Eventually a toxoid was produced, but the peak of the epidemic had passed, and immunisation was not then thought necessary. Late in 1942 tellurite cultures could be made and useful diagnostic help was gained from these. The technical staff carried out highly creditable work in these investigations under difficult conditions. Water examination, and all other common diagnostic tests were also carried out by this department. A few blood cultures were made but without positive result. Vaccines were also produced, chiefly for dermatological conditions. Kahn tests were performed jointly with the laboratory of the British hospital, which held a supply of the antigen. Parasitological work was considerable, and in the diagnosis of amoebiasis collaboration with the physician who performed sigmoidoscopy was found most helpful. Finally morbid anatomy, and, with some ingenuity, histology were studied in the laboratory.

Radiology. The X-ray gear of the A.I.F. was transported safely to Changi, but owing to the move to Roberts Hospital, it had to be re-assembled and dismantled twice. Major B. L. W. Clarke was radiologist to the combined hospital till August 30th 1942, when he was transferred to dermatology, and Major Uhr took over the X-ray work. Two rooms were shared by the British and Australian hospitals, one used for processing only. Power was supplied by a trailer unit until the supply was provided in the area. Work was done with an Ultrays and a Siemens portable unit. At Roberts Hospital the equipment was pooled; this did not work very well at first as the A.I.F. had 350 dozen films at first and the British force none. The British Solus unit broke down late in 1942 but a G.E.C. unit was placed in commission. Radiography was done in the mornings, and fluoroscopy at night. In ten months 1,384 patients were examined by X-rays.

Dental Centre. The work established early under Major Rosson continued as long as supplies could be obtained. During 1942 additional purchases were made in Singapore by a dental officer attached to a party working there. While it was possible a great amount of work was done to

make and keep the men in the area dentally fit. A surprising feature of the dental state of the troops was the healthy appearance of the teeth and gums. This may have been due to the lessened amount of food residue, and the necessity for more thorough chewing. Damage due to biting hard foreign substances in rice and other food caused more trouble than caries. Shortage of rubber made denture work difficult and finally impossible, but while facilities existed large numbers of repairs were carried out. Casting work for the British dental service was done also in the A.G.H. dental clinic, and work was performed for A.I.F. parties arriving from Java and other parts of the Netherlands East Indies.

Physiotherapy. Remedial exercises and other physical methods of treatment were found necessary, and a department of physiotherapy was opened, and used a trained masseur. Major Clarke and S/Sergeant Buck devised an infra-red apparatus, and Captain Bush constructed appliances for various purposes. Some of the patients suffering from the effects of some of the deficiency states benefited greatly from these methods.

WORKING PARTIES

At this stage it is necessary to look back over 1942 in Changi and give some attention to the various parties of men who were coming into and leaving the Changi area. Parties of Allied troops and civilians arrived in or passed through the area from time to time, and up to the final phases of captivity these population changes continued. They were of importance themselves as they introduced some differences in the hazards of life to the men and they also gave opportunity for the introduction of infective diseases. Other working parties of variable size were sent by the Japanese to carry out various projects chiefly on Singapore Island or the adjacent mainland. Some of these parties returned to Changi after a period, others were diverted to other projects. In addition considerable numbers of men were returned to the main concentration area for medical reasons. On a larger scale were the parties which were known as "A" Force, "B" Force *et cetera*, which were dispatched to other more distant camp areas. Some of these were merely transferred to other concentration areas, such as Japan where the "Senior Officers' " party was sent; others were moved up-country to Burma or Thailand for specific works, such as the railway built by the Japanese to connect Moulmein with Bangkok.

Shortly after the concentration of British and Australian troops in the Changi area the Japanese army demanded men for working parties, and though accurate records were not kept during this early period, the numbers of the A.I.F. working parties in various camps in Singapore rose from 577 at the end of February to 2,769 at the beginning of April, in addition to 652 who had returned on medical grounds.

All these working parties were provided with adequate medical assistance and supplies. Medical officers and orderlies were attached to them, having regard to the number to be served and the estimated duration of their absence. The smaller parties were issued with enough equipment for

a medical inspection room, and the larger ones for a small camp hospital. Until the end of June 1942, replacements of medical stores were made when sick returned to Changi, and others sent back in their place, but the Japanese then forbade the sending of supplies to working parties, stating that they themselves would provide supplies. This undertaking was not kept, and working parties had to purchase what they could out of the working pay they were allowed. Naturally the supply of drugs obtainable dwindled, and prices rose fantastically; one atebirin tablet cost 50 cents. By October Changi administration decided to ignore the Japanese order and resumed the practice of sending replacements of drugs.

Fortunately the working parties received a relatively better food ration than that issued in Changi. The rice ration was adequate, 24 ounces a day, some meat was supplied until the frozen stocks were exhausted and fresh vegetables were supplied in varying amounts which were sometimes satisfactory. Some supplements could also be bought at canteens established in the camps. It was disappointing that dietetic deficiency states appeared just as frequently in Changi; this was probably due to the much harder work done in the camps, and possibly also to the greater proportion of carbohydrate to vitamins, but it was convincing proof of the small margin of nutritional safety in the diet. The Japanese often would not allow patients with nutritional diseases to be sent back to the A.G.H., and many of them were treated in camp hospitals, where excellent work was done by the medical personnel so far as the limited supply of essential drugs would permit. British and Australian troops worked together in many of these camps; they supplied their own medical attention, and the details mentioned hereafter refer in the main to the A.I.F. The following are some brief references to the work done in individual camps.

Great World. This camp was one of the earliest and was located at the Great World Amusement Park under good conditions. The men did hard work moving freight to and from railway trucks and godowns. There were 1,686 men there on 29th July 1942, and the average number attending sick parades was 150. A camp hospital of six wards accommodated eighty men, but there were seldom more than thirty in it. The medical arrangements were very satisfactory. On 22nd October 1942, the camp was closed and the men were moved to the River Valley Road camp.

Adam Park No. 1. This camp was also good, though the work was arduous, on roads and building construction. The first party on 4th April 1942 included 2,000 A.I.F. and 1,000 British troops, who were accommodated in concrete houses with electric light and sewerage. The camp hospital had 150 beds equipped, in May the number unfit for work was 400, and sick parades sometimes numbered 200 twice daily. In July and August beriberi was very prevalent and many men were sent to Changi for treatment; no specific cause for this high incidence other than dietetic insufficiency was revealed by investigation. In July the camp population was halved by sending a detachment to form Adam Park No. 4 Camp, and after a party of over 550 had been sent overseas in December

the camp was closed. A great amount of medical work was done in this camp: in seven months 3,634 patients were admitted to the camp hospital, mostly for short-term ailments, and 190 minor operations were performed. Much dental work was carried out, and dental officers even treated some of the Japanese. The troops were 50 per cent dentally fit at the end of the period. Pathological work was carried out in this camp. Malaria, which was demonstrated microscopically in 291 out of 1,986 examinations, was an important hazard. Amoebic infection was discovered in a few men.

Bukit Timah No. 5. This party did not have good conditions. Its original strength on 4th April 1942 was 800, housed in poor shops and huts, and the malarial rate was high. Requests were fruitlessly made to the Japanese for anti-malarial measures to be applied. The work was hard, at the Ford Works and on roads. The party left for the River Valley Road camp in November 1942, and returned to Changi at the end of the year.

Mersing Endau. This party left Changi on 18th April 1942 and was well housed in barracks at Mersing. Water supply and sanitation were good. The work was dangerous, involving the removal of mines; three men were killed and eleven injured by explosions. Scrotal dermatitis from food deficiency appeared in July, but the most serious disease was malaria, which infected 75 per cent of the men. It was fortunate that no deaths occurred for the Japanese would not permit drugs to be sent from Changi and yet supplied the most inadequate amounts themselves. The party worked for a short time removing mines along roads near Batu Pahat, and returned to Changi late in August 1942.

Pulau Bukum. Two hundred and twenty men left Changi on 21st April 1942. Conditions were bad on this island. The work was heavy, the incidence of malaria was very high, and with the totally inadequate supplies given by the Japanese, would have been more serious only for the arrival of drugs and a microscope for diagnosis from Changi. Several men died from malaria. In July there were 118 men off duty out of a total strength of 265; 95 men paraded sick and 25 were in the camp hospital. In August the party was split into two sections, one going to Pasir Panjong and the other to Woodlands.

Thomson Road. No. 3. On 5th May 1942, 1,900 men left Changi for this camp which was well housed in concrete structures. Road and construction work was fairly hard, but owing to good conditions the sick rate was low. The Japanese allowed malaria control and purchase of extra foodstuffs, including rice polishings and yeast. Late in November 1942 the camp was transferred to River Valley Road.

Johore Bahru. This party of 160 left Changi on 5th May 1942 and occupied good quarters in the civil gaol and with good water supply, sewerage and electric light. The party did light work for some weeks and returned.

Lornie Road. This party numbered 750 and also left Changi on 5th May 1942; the work was fairly hard, but conditions were good in an area near Adam Park camp where the party was transferred in August.

Serangoon Road. This party of 300 left on 25th May 1942, and encountered bad conditions at first in dirty native huts. Work at the Ford Works was very hard, but general treatment was good. Malnutrition appeared within a month when up to 18 per cent of men were unfit for hard work, through diarrhoea and beriberi. Scrotal dermatitis appeared later, but health improved after a time: the camp was merged with Adam Park in October.

Adam Park No. 4. The strength of this camp on 15th July 1942 was 597. Quarters here were good, the work was hard, but general conditions were good. Health was satisfactory in the main, and food fair by local standards, though scrotal dermatitis was fairly prevalent. This camp also moved to River Valley Road on 31st October.

Woodlands. The 103 A.I.F. troops transferred here from Pulau Bukum were well quartered and conditions were satisfactory. Relapsing malaria acquired in Pulau Bukum was troublesome. The party was sent to Pulau Blakang Mati on 5th August 1943.

Pasir Pajang. The men from this camp were redistributed in November: conditions were reasonably good.

River Valley-Havelock Road. The original party left Changi in March 1942 being one of the earliest to move. It formed the A.I.F. Building Detachment; the work was heavy, but health was good. There was no A.I.F. medical officer until October 1942 when a party of 1,000 A.I.F. from Changi replaced British at Havelock Road. Combined parties here formed a camp hospital of 150 beds, and the medical personnel worked together. The men were worked very hard and allowed little rest, and towards the end of 1942 medical supplies became very scarce. The medical services in Changi were able to send a good supply of drugs, but the sick wastage was considerable, owing to dietetic deficiency states, and chemical burns from lime and caustic. There was a daily sick rate of 15 per cent. The camp was closed on 21st December 1942 and the whole party returned to Changi.

This covers most of the movements and experiences of working parties during 1942; by 1943 the majority of the A.I.F. troops in working camps had returned to the Changi area, or left for destinations up-country or overseas. There were still parties of Australians in Pulau Blakang Mati and Woodlands. More will be said later about these and other working parties sent out during the last year of captivity.

OVERSEA AND UP-COUNTRY WORKING FORCES

Other most significant episodes during the early period were the constitution and despatch of the working forces sent to up-country and oversea

destinations. Medical detachments were sent with these parties, and as it was impossible to foresee the conditions under which they would work, there was difficulty in deciding on the amount and type of medical assistance likely to be required. This difficulty was intensified as time went on, for the troops in Changi included a steadily growing proportion of unfit, and more medical personnel were needed for their care. At first the A.I.F. headquarters in Changi decided and selected the medical section of each party according to estimated needs, but later it was necessary to restrict the numbers. Later still the Japanese detailed the number of medical officers and other ranks to accompany each force. Some forces consisted entirely of medical personnel. The question of medical equipment for these forces was fraught with great difficulty. Not only large parties required certain basic equipment but small parties too, and those passing through from Java to distant destinations also needed medical and surgical kits, as they usually possessed nothing of this sort. The Japanese Army would not supply or replace such equipment, nor would they give any information about the medical facilities, if any, provided for each force. Sometimes an assurance was given that such parties did not need medical equipment: experience showed that no reliance whatever could be placed on these assurances. The "Forces" which left Changi were as follows:

"A" Force. Three thousand A.I.F. left on 14th May 1942 under Brigadier A. L. Varley, with Lieut-Colonel T. Hamilton as S.M.O. The medical section consisted of 15 officers, and 127 other ranks, and by order of the Japanese only an emergency surgical kit was taken, a microscope, and a good supply of drugs, including atebirin, quinine, sulphapyridine and compressed yeast.

"B" Force. After issuing conflicting orders the Japanese required a force to be formed including 1,500 A.I.F. for an oversea destination. A detachment of three unit medical officers and members of the 2/10th Field Ambulance under Lieut-Colonel E. M. Sheppard was sent with the minimum equipment for a hospital of 100 beds, including a pathological diagnostic outfit, with necessary drugs, including cholera vaccine. There were 13 medical officers and 145 other ranks.

Japan Party. Two parties "A" and "B" were formed, but the former was not sent. The "B" section comprised all officers over and including the rank of colonel. Medical officers were Colonel A. P. Derham, Colonel E. R. White, Colonel D. C. Pigdon, Captain D. J. Brennan and Captain P. N. O'Donnell, and there were eight other ranks. This party left for Japan on 16th August 1942.

"C" Force. This party of 552 A.I.F. left Adam Park on 28th November 1942 ostensibly for Japan or Korea, accompanied by Captain A. K. Barrett and fourteen medical other ranks. Medical and surgical supplies were sent from Changi.

"D" Force. This large force for Thailand consisted of 2,780 British and 2,200 A.I.F. troops. The A.I.F. component left on 14th to 18th March 1943. Major A. R. Hazelton was S.M.O. of the combined force; there were seven A.I.F. medical officers and thirty other ranks. Though the Japanese stated that only enough supplies need be taken for the voyage, Malaya Command decided that, as the destination was highly malarious, six months' supply of quinine, plasmoquine, and sulphapyridine should be taken. The Japanese arranged for tests for malaria and dysentery on all men, and stated that no man who had suffered from malaria in the last eight months or dysentery in the last three months would be allowed to leave. All men were vaccinated and inoculated against cholera and plague. The party carried copies of recipes for production of yeast and grass soup and extract, and notes on treatment of eye conditions.

"E" Force. On 28th March 1943, on eight hours' notice a force of 500 British and 500 A.I.F. troops left for an oversea destination. Major H. H. Eddey acted as S.M.O. for the whole party: there were two A.I.F. and one British medical officers, and eight Australian and two British other ranks. Equipment for a twenty bed hospital was taken with adequate quantities of drugs. This party included a number of men not fully fit, but only those fit to undertake a journey were sent, and none with a history of amoebic dysentery or eye disturbance.

"F" Force. This force of 7,000 men was ordered to leave by train on 18th to 26th April 1943 for an up-country destination. The A.I.F. supplied 125 officers and 3,300 other ranks, with 12 A.A.M.C. officers and 224 other ranks a total of 3,661. The Japanese stated that there would be seven camps each under a major of the Japanese Army. It was further stated that men only fit for light duty could be taken, but in spite of a review of all the light duty men by the A.D.M.S. and D.A.D.M.S. some 100 men had to be sent who were not then fit for any duty. Equipment for a 250 bed hospital was taken: many items including essential drugs comprised 40 per cent of the remaining stocks. Medical tests of the force were carried out. Drugs were issued by the Japanese for malaria prophylaxis, including quinine, one tablet for ten days, and plasmoquine one tablet on the tenth day, but these were taken as stock and not used prophylactically. Lieut-Colonel J. Huston, R.A.M.C. was S.M.O. of the combined party and Major R. H. Stevens, S.M.O., A.I.F.

"G" Force. This force was called for by the Japanese as a reinforcement of "E" Force but was sent to Japan. They stated that any medical personnel accompanying the force would be regarded as members of a working party. Accordingly two medical companions were taken, and a sergeant pharmacist from the N.E.I. went with the N.E.I. component of 1,000 men. Three hundred British and 200 A.I.F. made up the party.

"H" Force. This party of 3,000 included 600 A.I.F. over half of whom were from Java. Equipment was taken for a hospital of 150 beds

Medical tests were applied to the members of the force, and great difficulty was found in filling the A.I.F. quota. Three A.I.F. medical officers and eighteen other ranks went with "H" Force on 8th May 1943 with Major E. A. Marsden A.I.F., as S.M.O.

"H" Force (Officers' Party). The A.I.F. provided 68 out of 320 officers making up part of "H" Force and provided one medical orderly. The British sent two medical officers. The fitness of officers was determined by medical boards.

"J" Force. This force left on 15th May 1943: it included 300 A.I.F. with Captain C. R. Boyce as R.M.O., and ten medical other ranks. The Japanese knew that many of these men would be unfit for work, and about eighty men from the A.G.H. and convalescent depot were included. Most of these men had amblyopia due to nutritional defects.

"K" Force. The A.I.F. provided five medical officers and fifty other ranks in this party of thirty medical officers and two hundred medical other ranks. The party was intended for reinforcements. Major B. H. Anderson the D.A.D.M.S. of 8th Division commanded the force.

"L" Force. This force was another purely medical party, which left on 23rd August 1943. It included fifteen medical officers and one hundred medical other ranks, three officers and seventy other ranks being supplied by the A.I.F. Lieut-Colonel Benson, R.A.M.C., commanded the force and Major H. L. Andrews was in charge of the A.I.F. party.

Reference has been made to parties passing through Singapore from Java on their way to join other forces. There were six such Java parties which came through. The first included Major Stevens of the 2/12th Field Ambulance, with nine other officers and fifteen other ranks. Most of this party remained in Changi. The other Java parties contained varying numbers of A.I.F. troops, and in most instances some A.A.M.C. personnel also. Lieut-Colonel N. Eadie, S.M.O., A.I.F. Java arrived with a fourth party and was equipped at Changi with a much needed medical kit for the party before he moved on two days later. Some field ambulance men and also sick berth attendants from the H.M.A.S. *Perth* accompanied the fifth party and stayed a while in the area. The commander of the sixth Java party was Lieut-Colonel E. E. Dunlop of the 2/2nd C.C.S. Some of the party were quartered in the 18th British Division area, and being without a medical officer were looked after while there by Stevens, who reported that 90 per cent of them were suffering from diet deficiency diseases. Arrangements were made for the whole party to be treated with rice polishings.

Two other Java parties arrived late in 1942. These consisted of N.E.I. troops with a high percentage of Eurasians. Medically they were cared for by the A.I.F. and Gunther reported that their condition was alarming following a shocking trip. A severe epidemic of dysentery flared up in three waves; fortunately British and Australian troops were not affected. Of 598 of these troops admitted to hospital 527 had dysentery.

It is interesting to note at this stage the persistent recurrence of malnutrition in the story of forces in the hands of the Japanese. Practically all the events so far related took place within some ten months after capitulation and in that period clinical dietetic deficiencies had affected large numbers of men in widely sundered areas, and made them the readier a prey to infectious disease. We must now follow the story as it is unfolded in the later years on Singapore Island, and then trace the journeyings of the forces which left Changi for destinations unknown.

CHAPTER 25

LATER EVENTS ON SINGAPORE ISLAND

At the end of December 1942 the risks of overcrowding the Changi area became apparent. The population of the area had been considerably reduced by the departure of working parties, but when these parties returned in December, the numbers were increased uncomfortably. There were in addition those who had been returned to hospital, and parties from other places, such as the N.E.I. Within a short period the numbers in Changi rose by 5,644, and the A.D.M.S. reported if something was not done to alleviate overcrowding there was a risk of epidemics of communicable disease.

PREVENTIVE MEASURES

As the incidence of deficiency states increased the burden cast on the Changi administration grew, for it was necessary to meet the needs of many of the men admitted to hospital, and even those being treated as out-patients, for example those attending the Selarang eye clinic. Yet stocks had to be conserved, and in January 1943 a definite policy was adopted by the A.I.F. for the treatment of deficiency diseases. "Marmite" was used only for the treatment of beriberi, keratitis and "retrobulbar neuritis", spastic paraplegia, dysentery, and in general for patients requiring dietary supplements who could not take rice polishings. The dosage was also laid down as follows:

	<i>Marmite</i>	<i>Rice Polishings</i>
Neuritic beriberi	360 grains 7 days	then 2 ozs. daily 6 weeks then 1 oz. daily
Keratitis	120 grains 28 days	plus 1 oz. for 30 days or more
Amblyopia	360 grains daily plus	1 oz. 7 days
	240 grains daily plus	1 oz. 7 days
	120 grains daily plus	2 ozs. 28 days
Painful feet		3 ozs. 14 days, or 2 ozs. with $\frac{1}{2}$ pint yeast 14 days
Glossitis, stomatitis, and scrotal dermatitis . . .		3 ozs. 7 days, or 2 ozs. with $\frac{1}{2}$ pint yeast 7 days
		2 ozs. 7 days, or 1 oz. with $\frac{1}{2}$ pint yeast 7 days

Fortunately some stocks of "Marmite" were still held by the medical units.

Yeast production was the subject of considerable trial and research at this stage: in January about 80 gallons a day was being produced at the

A.I.F. centre. Work was further pursued by the medical research officer, Captain Woodruff with the objective of obtaining accurate data concerning deficiency diseases in the area which might lead to improvements in the health of the A.I.F.

It is an appropriate place to mention the emphasis laid on the educational and scientific side of the medical life in Changi. At meetings and instructional rounds knowledge was disseminated by lectures and discussions, having regard not only to the pressing problems to hand, but also the basic subjects of post-graduate study.

Interest in nutrition was maintained at the highest level, and from this time onwards attempts were made to relate nutritional deficiencies to the clinical syndromes which swept in turn over the military community. Accurate clinical accounts were also compiled by medical officers. Continued efforts were made to improve the dietary, and in addition to the provision of supplements, all possible pressure was applied to the representatives of the Japanese to supply an adequate ration. During January 1943 a list of the requisite additions to the diet was presented to the Japanese, for although general health was then fairly good in the area there were signs of decline due to malnutrition.

Matters of hygiene received close attention during 1943. Towards the end of 1942 the engineers were able to connect the high pressure water main, and an intermittent supply was secured. This was improved later when the Singapore water supply was restored, but water used for sanitation was still obtained from shallow wells. In January 1943 the Australian engineers and members of the 2/5th Field Hygiene Section succeeded in restoring to use two sedimentation tanks for the sewerage system, and some time later brought into commission the whole septic tank installation, thus allowing the whole Selarang area to use the sewerage system. The greatly increased numbers using this system threw a strain on the water supply and the sedimentation tanks, but by the use of local auxiliary tank and bucket supply for toilets, and separate disposal of paper, practicable and efficient sanitation was maintained.

The hygiene section was also busy in other directions. The attachment of members of the R.A.E. to this unit was most useful, and standards were laid down to ensure efficient methods of hygiene in kitchens and elsewhere, as well as improved sanitation. Education and the employment of picquets kept the cause of hygiene before the men.

Anti-mosquito measures were necessary from the start, as has been pointed out earlier. Later in 1943 the A.I.F. anti-malarial party at Selarang under Major Burnside had managed to carry out quite an extensive programme. The area was surveyed for larvae of vectors, and dangerous areas were treated by oiling until September when the supplies of oil became very scarce. Since April 1943 no larvae of *A. maculatus* had been found, and by economy and care the area remained free. Maintenance work was also carried out on the drains in the camp. Constant liaison was kept with the British force in this work, and Lieut-Colonel Strahan gave valuable help.

HOSPITAL WORK

In the hospital, medical work was in some ways less pressing, because the numbers served were reduced, and prophylaxis in some directions was more successful. The Nutrition Committee cooperated with the hospital services in obtaining a better basic diet, containing fish and towgay. Deficiency diseases became less intense and less numerous, owing in part at least to the improved dietary organisation by the force itself. There was no positive evidence of deficiency of ascorbic acid and free exhibition of this vitamin in the treatment of hospital patients produced no change in their condition. Lieut-Colonel Harvey noted particularly that the average standard of physique had deteriorated. The men tired more easily, became infected more easily, for example in minor lesions of the skin, and broke down more readily under strain. With the persistence of an inadequate ration of protein and fat this was to be expected. In October 1943 Harvey stated:

We are in short working on a fine margin, our bodily reserves have been seriously encroached on, and we are not in a fit condition to face any emergency, should it arise.

Dysentery became less severe. Early in 1943 severe and occasionally fatal infections were seen, especially in those entering the area from Java, but since February no deaths had occurred. Amoebic dysentery still appeared both as a primary illness and in relapsing form. Bacillary dysentery in its severer types was controlled by sulphonamides. Following observations by Major T. P. Crankshaw A.A.M.C. an investigation was carried out in April by Bruce Hunt on the value of sulphapyridine in this disease; at this time the evidence had not been accurately assessed, though several British and Australian observers in Changi thought it worth full enquiry.

The patients investigated were those with an acute illness severe enough to warrant specific therapy, and an equal number were at first treated by sulphapyridine and by the conventional use of sulphates with free fluids. The latter group was used as a control, but the results of the drug were so incontestably better that after three weeks only sulphapyridine was used. In all clinical respects the original two groups were alike; it may be noted that some 20 per cent of both series suffered from severe toxic dysenteric symptoms. The total dosage of sulphapyridine was at first 12 grammes, later reduced by one-third: and was given within one and a half days or less in most cases. The swift subsidence of symptoms, the restoration of the stool to normal, and the lessened stay in hospital were striking, and Hunt concluded that the drug was a specific for bacillary dysentery. A further observation on chronic dysentery was made, and clinical and sigmoidoscopic evidence pointed to the value of sulphapyridine here also, but further trials were required. Stevens in a similar but uncontrolled series arrived at the same conclusions as Hunt as to the great value of sulphapyridine in acute bacillary dysentery. No other infectious epidemics occurred during 1943. It was interesting that, while no cases of faucial diphtheria were seen, there were several of the cutaneous form.

The number of dyspeptics admitted to hospital steadily increased, and it was observed in several men operated on for inveterate peptic ulcer that ulceration was both active and extensive. Radiological examination was not readily carried out with restricted facilities, but confirmation of the diagnosis of ulcer was often obtained. As many as half the patients in the medical wards had dyspepsia of varying severity. Some of the most seriously ill men were admitted from the Japanese gaol, where they were submitted to conditions which caused severe malnutrition. The diets received by these men were deficient in all respects.

Three patients were admitted to hospital with pulmonary tuberculosis; one died from tuberculous broncho-pneumonia. One was treated with artificial pneumothorax, but without good response. Respiratory disease was not common, but asthma was very persistent in a number of men, and kept them for long periods in hospital. An inflammation of the lower parts of the urinary tract of apparently non-specific origin was often seen.

Reports of an outbreak of cholera in Singapore stimulated a tightening of all measures of hygiene in the area, and all ranks were inoculated with 0.5 cubic centimetre of cholera vaccine in August. Very little vaccine was available, but second doses were given to those who were handling food and water.

In the surgical wards the work diminished progressively as more men were transferred to other areas. Gastric surgery was an important feature. In addition to a number of operations for acute perforation of peptic ulcers, Osborn carried out deliberate surgery for the relief of ulcers resistant to medical treatment. The operations performed included anastomoses and partial gastrectomy.

Radiological work continued as long as the films lasted, when fluoroscopy alone was available. The Australian Ultrays unit developed a fault in the transformer, but the Siemens portable Heliosphere did all A.I.F. X-ray work from February to October 1943. This unit was originally on loan from the Selemban civil hospital to the 2/10th A.G.H. Major Bridgland of the A.I.F. by using the transformer of this unit was able to operate the tube and tube stand of the Ultrays set and this worked satisfactorily for screening. Film supplies at this date, November 1943 were practically exhausted. While they lasted the Australian films of Kodak Ltd. were much superior to other varieties used in Malaya, withstanding the climate better.

During August the Japanese ordered the removal of the hospital from the Roberts Barracks to the Selarang area. On 25th August this move was completed, and the A.G.H. occupied three barrack blocks and one other building. A common operating theatre was established with the X-ray department in the same block, which had been converted for this purpose during the campaign. A new A.I.F. dental centre was opened here, and the A.G.H. medical stores, and ration stores, shared a floor with the skin clinic and the dispensary. All the medical inspection rooms were closed when this move was made, and aid posts were set up in their stead. The convalescent depot continued to work as before and held some

200 men. Since the end of May the precaution had been taken of holding convalescents for a time in hospital, so as to safeguard them from being included in working parties by the Japanese while they were unfit for any work. The average strength of the A.I.F. troops in the Selarang area was about 1,100 at this time.

The growing proportion of men left in the area who were unfit for all types of duty led to the adoption of a system of medical classification based upon the capacity for work. This was made up as follows:

Class I	Fit for heavy duty.
Class II	Fit for light duty.
Class III (a)	Fit for very light duty.
Class III (b)	Fit for no duty.
Permanently unfit	(a) No duty.
	(b) Able to do certain duties in camp.

Artificial Limbs. One of the difficulties attending the care of the relatively unfit was that of keeping the morale high. Efforts were made to keep men interested in doing what their physical condition permitted. One important medical activity concerned with rehabilitation was that of making artificial limbs. This began at an early date in Changi, when during March 1943 a conference was held at the convalescent depot by Lieut-Colonel Glyn White, Lieut-Colonel Webster, Captain C. Hill (ordnance), Lieutenant Campbell (engineers) and Warrant Officer A. H. Purdon 2/30th Battalion. Purdon was authorised to organise a workshop, with the aim of producing an artificial lower limb adapted for a long and a short stump. With very modest equipment the staff of what was afterwards known as the Artificial Limb Factory made a start. Material used comprised 3/64 inch motor body steel from discarded vehicles, rubber tree wood, wrought iron from splints, rubberised fire hose and copper wire. No plaster of Paris could be obtained for making moulds, but the shape and size of the stump were moulded by a copper wire cage, from which a wooden mould was made and a panel was fashioned to fit by a panel beater. The joints were welded and hinges were constructed from iron. The first leg made was of the peg leg construction, but the next leg was provided with a metal foot which could flex at the ankle, with its positioning controlled by a spring in tension. A corset fitting the upper part of the limb was made from fire hose. The first limbs were designed for amputations below the knee, but higher amputations were treated also. These limbs had knee hinges stabilised by a spring fixed to the rear of the true axis of the knee and weighed about 8½ lbs. and those of the lower amputation about 6 lbs. Great care was expended in eliminating faults and improving their comfort and manoeuvrability. Attempts were made to lighten them, but though aluminium water tanks and containers were obtained by various means they were not successful, as the gauge of the material was too heavy. An improved ankle joint was devised and was used successfully. This highly

ingenious and painstaking work was of great value, not merely for the physical help it gave mutilated men, but for its demonstration of what could be done under the most unpromising conditions.

Soap. Another activity in Changi was the manufacture of soap. Its constituents were obtainable in the area, fat from palm oil, or coconut oil, and alkali from potash in wood ash. Palm oil, being readily saponified, was a suitable fat which did not produce too brittle a soap. In manufacture the oil and alkali were boiled together, the soap was precipitated in a saline solution, and the product purified by successive washings with alkali and water. The percentage of alkali in wood ash varied widely, but the yield of a given regional sample was roughly assessed by the charcoal content. Considerable difficulties were encountered from unduly high content of water or of oil in the product, but these could be overcome. As a by-product glycerin could be recovered by evaporation of the liquor after precipitation.

The Red Cross Society continued to give what help was possible by purchase, the local commissioner acting through the representative of the International Red Cross. On 7th September the Japanese told the local representative that he was not to order further medical supplies through the International Red Cross, on the grounds that it should rest with the I.R.C. to obtain supplies and to try to arrange that fair average requirements should be met from their central store in Singapore. On 1st October a further obstacle was imposed to obtaining Red Cross assistance by the Japanese refusing to recognise the A.R.C.S. representative because he was a prisoner of war. After this, money received was from officers' bank balances and was handled by the army paymaster.

PROBLEMS OF NUTRITION DURING 1943

In November 1943 there was some increase in the incidence of sickness among the A.I.F.: this was due to tropical ulcers and septic abrasions, which were often associated with adenitis. Trouble was found with rice polishings becoming rancid on growing a fungus and thus being too unpalatable for use. However, more success was gained in making an extract, which was prepared by heat derived from an old electric water heater. The pathology department could make only a rough test of the efficacy of this extract by its effect on the growth of yeast cells, or by occasional tests on fowls with some signs of thiamin deficiency, but the process was a success and for three months an extract of condemned rice polishings was used on a small scale without any clinical evidence of lack of potency.

By the end of 1943 some views had been formed of the value of various supplementary sources of vitamins. Of course the value of supplements did not lie only in the accessory food substances they contained, for in this way the main constituents of the diet were also augmented. Examples of food bought from money derived from levy on officers' pay, A.A.M.C. pay and other ranks' working pay were sweet potatoes,

whitebait, peanuts, towgay (green dhal), maize flour, eggs, pineapple, coconuts, and gula malacca. Had purified vitamins been available in any but small quantities more critical information might have been obtained as to their therapeutic or prophylactic effect, for the amount of vitamins contained in the foods actually consumed by the men was only approximately known. Difficulties with rice polishings have been described; even with administration of fresh greens such as towgay and kang kong, believed to be good sources of riboflavin, the dosage was uncertain. Nicamide given by injection of 2 cubic centimetres a day produced definite improvement of painful feet, but patients who were unimproved showed little change after treatment in hospital by green leaf extract. Increased production of grass and leaf extracts was undertaken in May 1943 to permit further enquiry into their effect on painful feet and amblyopia. In this ocular deficiency the Nutrition Advisory Committee suggested that those patients whose eyes showed a stationary condition but without atrophic changes should be given massive doses of riboflavin in the hope of arrest of the condition.

The value of yeast was also questioned, not because of doubt of the existence of vitamin *B*₁ in it, for it was recognised that more vitamin *B* complex was present in the product than in its constituents. But the project of manufacturing large quantities of yeast for prophylactic purposes was not found practicable. The doubts as to the propriety of using sugar in the process have been mentioned; the A.D.M.S. probably expressed the general view when he pointed out late in 1943 that apart from the value of sugar as a sweetening agent and the greater importance of a substance of a dietetic and therapeutic value, the large scale manufacture of yeast was impracticable. It had, in fact, been given up as a major project by the A.I.F. late in 1942. However, this did not mean that the therapeutic value of yeast was disregarded or that its production was discouraged. The manufacture of grass extract in bulk became difficult late in 1943 through mechanical problems, and therefore yeast production was continued.

Another activity which began during 1943 was the production of surgical alcohol. Major Rosson, senior dental officer in the A.I.F. in March made a trial production of alcohol by fermentation of sweet potatoes and gula malacca. Three pounds of each with the addition of yeast produced one pint of absolute alcohol. The residue of about 2 lbs. made a substitute for "Marmite", which was named "Changimite". It proved satisfactory on clinical trial, and during a period of six months the dental centre made in this way twelve gallons of alcohol and twenty gallons of "Changimite" per week. Alcohol was later regularly produced from the grass extract centre.

THE RETURN OF WORKING FORCES

In December 1943 members of "F" Force began to arrive back in Changi. In all the A.I.F. troops in this part of the force numbered 1,658; they were in a poor state of health, and a considerable number were admitted to hospital. It was evident that more men would collect in Changi

who needed medical attention. Among "F" Force there were 256 cases of eye disease due to malnutrition and at least 56 men so affected were known to have died from other infective and nutritional diseases. Of 134 patients from "F" Force seen at the eye clinic in January 1944, 56 had amblyopia, but fortunately the number with vision 6/18 or worse was small. Dark glasses were being provided by the Red Cross to men considered to need them by the medical officers. A large proportion of men were suffering also from chronic malaria. Little primary malaria was seen in Changi at the beginning of 1944, though anopheline breeding had been discovered outside the perimeter and strict precautions were being observed.

The position then was fairly good for vitamin supplements; a reserve of "Marmite" was held, grass extract was available for out-patient use, and extract of rice polishings was now being made by Burgess for therapeutic use. Amongst the extra items of food obtained by purchase eggs played an important part. Some of the men had private supplies from home-grown poultry; they were permitted to sell eggs if they wished at predetermined rates, and eggs were also presented by some of the growers. The Australian Red Cross Society helped greatly in supplying eggs to the British and Australian hospitals on an equal basis. The need for extra protein for these undernourished men was pointed out by Harvey, Bye and Osborn. A reserve of frozen meat and milk was held in Changi, and the A.D.M.S. was able to assure the hospital staff that though lives had been lost in the "up-country" through lack of food, this would not occur in Changi.

On 22nd January 1944 the Japanese notified the Changi administration that 150 patients might be expected in the hospital from the Sime Road camp following their return with "H" Force. Already men with amoebic dysentery had been seen from "F" and "H" Forces. Instructions were also given by the Japanese that all men with malaria were to be treated in hospital: primary cases were seen, though only in moderate numbers, but it was evident that many relapses would appear among the men returning from Thailand. A malaria centre had been set up for treatment of men not needing hospital care, and early in February this was full; there were 279 A.I.F. men under treatment. In March the Japanese further ordered that all patients with malaria would be retained in hospital till the convalescent period was complete. This was quite impracticable and the convalescents were treated in their own lines. In order to conserve supplies of anti-malarial drugs restricted courses of treatment were laid down. Benign primary infections were treated with atebirin five days and plasmoquine five days, and recurrences with quinine 20 grains for seven days. Malignant infections were treated with quinine two or three days, atebirin five days and plasmoquine after two days' rest for five days. In April the work of the malarial centre was resumed and terminated in May. Supplies of drugs were received irregularly: sulphaguanidine was obtained from the Japanese in January 1944, but anaesthetics and anti-amoebic drugs were very scarce. Acriflavine, alkalis, zinc oxide and *Tinct.*

Benzoinae Co. were obtained from the American Red Cross. The Japanese supplied anti-typhoid and anti-dysentery vaccines.¹ At Sime Road Marsden fortunately still held some supplies taken with "H" Force.

In April a new deficiency syndrome was observed, characterised by skin rashes, ulceration of the lips, mouth and throat, and in some cases reduction of the granular white blood cells. The symptoms were believed to be due to dietetic deficiency accompanied by infection. At the end of the month another party of "F" Force arrived without warning; 124 men were admitted to hospital, including 5 with amputations. The following day a further party arrived with 80 patients.

A summary of the figures of "F" and "H" Forces at the end of April showed that 3,662 A.I.F. troops left with "F" Force of which 2,223 returned; 666 left with "H" Force and 494 returned.

CHANGI AND KRANJI

In May notice was given by the Japanese of further changes in hospital arrangements. A "base" hospital was set up by the British medical services at Woodlands near the Johore causeway, and a "camp" hospital at Changi gaol by the A.I.F. This move divided the Changi gaol medical area into two. One section moved to Kranji, in the Woodlands area, and was staffed predominantly by the British and the other in the gaol area was staffed by Australians. Reconnaissance of the gaol area showed that there was considerable danger of overcrowding and a request was made for additional quarters. There was also a risk of insufficient space for sanitation, as this partly depended on borehole latrines. On 28th May the patients were removed by trucks to the new area at Kranji. The new arrangements entailed some alteration in administration. Lieut-Colonel Neal was in charge of the medical services, with Lieut-Colonel Collins in charge of Woodlands and Lieut-Colonel Glyn White in charge of the gaol area. Lieut-Colonel Summons took charge of the hospital as before and Major Gunther of the hygiene. In the medical area of Changi gaol camp were accommodated the camp hospital, the artificial limb factory and the vitamin extract centre.

Work at Changi. During the next month there was a vast amount of work done in the gaol area; much construction and adjustment of accommodation was required to utilise the very cramped space without undue overcrowding. Dysentery was prevalent and attendances at the skin clinic were rising, and increased by the frequency of scabies at this time.

The move to the camp hospital was completed by the middle of June, but even then the necessary huts were not all constructed. Some of the buildings were of permanent type, others were huts, some of which were made of attap with earth floors and sleeping platforms. Fortunately there was enough permanent housing to serve the seriously ill and provide a satisfactory operating theatre and medical stores. A medical inspection room was placed in each working group area of the camp, and out-patient

¹ It may be noted that at the Singapore General Hospital the Japanese maintained a research unit which produced essential sera and vaccines, and apparently did valuable work.

clinics were provided both in the gaol and in the medical area for the occupants of these respective compounds. These clinics were used as before, mainly for the purpose of diagnosis and classification, and there, with meagre equipment and poor facilities good work was done. Laboratories, chiefly for malarial diagnosis, were set up and gave prompt service.

Sanitation was only of water-borne type in the gaol buildings: the remainder of the area was serviced by boreholes which could only be used for ten days then rested twenty days. An improved design was introduced by Gunther which could be flushed by buckets into the sewerage system.

It was noticeable that the experience of the past two and a half years had made the men more conscious of hygiene, and much less trouble was caused than previously. The mild dysentery outbreak of the early weeks soon subsided. Diet was not good; in fact the official supplies were as bad as in 1942. Though only two Red Cross issues had been made, in December 1942 and January 1944, reserves were still in hand and local purchase was exploited as much as possible. The previous organisation by which the British and Australian wings of the hospital had separate messing arrangements and reserves of food was revised by agreement, and all reserves were pooled, three-fifths going to Kranji and two-fifths to the gaol. In this way the A.G.H. was able to make a substantial contribution of meat, vegetables and tinned milk to the common cause.

Special food for hospital patients was distinctly limited in supply and had to be controlled with care. Local purchase supplied eggs, greens, sugar and oil. The economy and wisdom with which the dietetic affairs of hospitals were managed on Singapore Island are worth note, for special diets were devised for certain conditions such as beriberi, peptic ulcers and pulmonary tuberculosis, and while all shared in the common stringency of food, those most in need were given a chance of recovery. The meagre nature of even the best diets will be evident from studying the tuberculosis diet, which consisted of the standard hospital diet plus 3 ounces of rice, two pieces of bread made from rice flour, soya bean flour and raggi, 1 ounce margarine, $\frac{1}{2}$ ounce palm oil, 3 ounces dried fish. If necessary milk and eggs were added. The possibility of an emergency was always before the administrators, who felt that it was imperative to hold some reserves, even though the individualistically minded physicians might ask for more for patients in particular need of help. The average strength of Changi gaol camp was then 10,000, 2,850 patients reported at the inspection rooms daily, and from 1st June 1944 to 28th February 1945, 14,661 patients were admitted to the gaol hospital; of these 5,252 were British, 7,869 Australian and 1,540 Dutch. The commonest diseases seen in hospital were dysentery and malaria, and in nine months 6,755 fresh cases of deficiency diseases were seen in the out-patient clinics.

Surgical work was mainly limited to the relief of emergencies, owing to the scarcity of essential supplies. The work of the hospital was made more difficult by the callous outlook of the Japanese on prisoners of war, and, as before, the basic ration supplied rose little above the starvation

level, while the demands for the performance of heavy tasks were not abated.

Work at Kranji. The tasks involved in establishing Kranji hospital were similarly great. Only with great difficulty were the staff able to direct their own labour to the essential tasks of accommodation and hygiene, which were barely finished when the patients arrived. The proportion of patients was 650 British to 550 Australian. The patients were accommodated in attap huts in an old rubber plantation.

J. C. Collins, R.A.M.C. commanded the Kranji hospital, and Webster the A.I.F. wing; Cotter Harvey and Osborn were in charge of the A.I.F. medical and surgical divisions respectively. The Australian staff consisted of 14 officers and 103 A.A.M.C. other ranks. In the main A.I.F. patients were cared for by A.I.F. medical officers.

The original idea of the Japanese was to use Kranji as the base hospital, and to send patients over there regularly from Changi gaol, but difficulties of transport hindered this plan, and patients eventually accumulated in Changi beyond the originally intended numbers. Kranji was somewhat cooler, and after initial difficulties had been lessened, though not overcome, with the ration scale as supplied to the hospital, the health of patients and staff was reasonably good. Calories were lacking in the diet, but the thiamin/non-fat calorie ratio increased slightly with a rise in the amount of green vegetables supplied.

Though loss of weight was noticed, deficiency diseases lessened in incidence somewhat and in severity. Some of the long-term patients were in a very unstable physical state, particularly those who had chronic dysentery. Very slight alterations in diet or in their general condition would precipitate oedema again, and cardiac symptoms also appeared in some, including one of the medical staff. A few deaths occurred among men from "F" Force, probably due in part at least to cardiac beriberi. Limited quantities of thiamin for parenteral administration helped the patients with severe neuritic symptoms, and their low protein intake was augmented by eggs obtained through the A.I.F. officers' messing fund in Changi. Malaria was fortunately uncommon in the primary form, thanks to an efficient malaria control group, which carried out regular inspections with draining and oiling of potential breeding areas. Recurrent malarial attacks were still seen among the men previously infected in the working camps.

Sulphaguanidine was available in small quantities and controlled acute attacks of bacillary dysentery. Amoebic dysentery, as in other areas, was an anxiety, for, although some degree of immunity was attained by some patients, the very serious nature of this infection was emphasised by the lack of specific drugs. A short course of emetine, consisting of only four grains, was used during 1944, while supplies lasted, but the condition of emetine resistance increased the difficulty of treatment. Enemata of acriflavine gave some symptomatic relief.

In September 1944 a case of pulmonary tuberculosis was diagnosed in a member of the A.I.F., and another was seen in October. No Australian

soldier was discovered with tuberculosis until the force had been in captivity for over a year, and the number seen was very small. This was a tribute to the care of selection, and to the use of fluorography, as shown by the greater number appearing in the British forces, thirty in the first six months. Five men with tuberculosis were under treatment in the A.I.F. wards at Kranji in 1944, where artificial pneumothorax was used for suitable cases. Later the tuberculosis patients were sent back to Changi, with a number of other men with chronic conditions of various kinds.

A mental ward in Kranji was busy; unfortunately deterioration of some of the patients was observed at this time, no doubt due in large measure to the long continued nature of the psychic strain to which they were subjected.

In October 1944 air raid precautions were carried out; the exercises held both by day and night were thorough and included training of fire fighting and demolition squads. A reserve of water was provided in Kranji in case of failure of the supply. After slit trenches had been dug during the following month the protective measures were complete. By the end of the year there were few very ill patients in Kranji, as most of those transferred from Changi were ambulant.

FURTHER STUDIES IN NUTRITION

In the Changi gaol hospital the work on deficiency diseases was pursued. The appearance of the "new syndrome", previously mentioned, stimulated enquiry into the inflammatory and haematological symptoms of this condition. Detailed clinical studies were carried out in the A.G.H. on the lesions of the mucous membranes of the lips, mouth, tongue and pharynx, and the bacteriology was studied, but no useful information was so gained. A wide variety of skin lesions was encountered, ranging from mild erythema to generalised exfoliative dermatitis. Photo-sensitivity was a common feature. Vesiculation and haemorrhagic lesions of the skin were troublesome. It was particularly noted that scrotal dermatitis was at this time uncommon. Blood changes were not invariable, but leucopenia occurred and three fatal cases were observed in which the total white cell counts were very low. It was pointed out that the disease occurred after two years of exposure to poor dietetic conditions, in which the diet supplied was of a low Asiatic standard.

The other syndromes which had swept like waves over the community of Changi were seldom seen in this later period, though exacerbations were easily excited. This applied with particular force to beriberi. Loss of weight was universal, and it is probably fair to assume that metabolic activity was also reduced. The effect of a flare of dysentery in reactivating beriberi was evident. The vitamin *B* complex had been insufficient in the diet of the men consistently and over a long period. It is not surprising then that in April 1944 of 3,746 men in the Changi area 324 showed signs of the pellagroid type of deficiency. It should be added that no mental signs were observed in these men. A persistent residual symptom was sensitivity of the skin to sunlight, but sensitisation of the skin to various noxae is a

common phenomenon. The outstanding feature of the camp diet was probably, as Burgess showed, the significant fall in nicotinic acid from January 1944 onwards: riboflavin fell in amount also; as always it was deficient, but the fall was not substantially greater than before. It was harder too to obtain the dietary supplements required. Another factor was the greater strain of sick men in camp, particularly those returning from working camps, where they had often been grossly underfed and overworked. Therapy was not very satisfactory, as enough of the specific vitamins was not held for the treatment of the sick.

The cultivation of gardens in the Kranji area was intensified during the latter part of 1944. There was a permanent garden staff and further demands for labour were met as far as possible by using patients fit for such duty. One advantage in this arrangement was that the patients received full pay for their rank and a daily extra meal prepared at the garden. The extra greens thus obtained were welcome, especially as Claffy had found that the deficiency type of amblyopia, also known as retrobulbar neuritis was improved by kang kong leaves in particular. In addition to the official gardens controlled by the Japanese there was considerable gardening activity round the individual huts.

The diet available for December 1944 at Kranji may be noted. For workers the Japanese supplied rice 420 grammes, oil 24.3 grammes, sugar 18.7 grammes, tea 5 grammes, soya bean 27.5 grammes, vegetables 393 grammes and fish 48 grammes. To this the messing fund added towgay 10 grammes and oil 25 grammes. The daily ration in all provided (reckoned in grammes) protein 56.8, fat 62.8, carbohydrate 474.8, a total of 2,700 Calories. The thiamin/non-fat calorie ratio for workers was 0.36 and for non-workers, who had an issue giving 2,560 Calories, this ratio was 0.39. It will be seen that there was but a slender safety margin. Rice polishings were, however, supplied at the rate of 10 grammes per day.

In the Changi gaol area two other points concerning nutrition were discussed, the use of black beans, and the conservation of "Marmite". Black beans were bought early in 1944, and during the wave of sore mouths and affected skins which pointed to a pellagroid affection the A.I.F. was much more heavily attacked than the British. During March 8.7 per cent of the A.I.F. strength suffered from these lesions, and they were at this time consuming a greater quantity of black beans. The beans were bought to provide additional vitamin *B*, and in view of some of the arguments which have been raised as to the cause of pellagra the propriety of using these beans was considered. The camp nutrition committee decided that the results of thiamin deficiency might be much more serious than those of the other sequels of deficiency of other components of the *B* complex, and thought it best to leave the committee to advise when beans should be added to the diet.

In October 1944 the reserves of "Marmite" had so dwindled that the rate of consumption was based on a six month period, and its administration depended solely on medical causes. This meant a 50 per cent reduction in dosage in the hospital: it was being used chiefly for beriberi,

amblyopia and skin lesions. The dangers of beriberi were still imminent in the Changi hospital, where numbers of men with severe types of this deficiency were seen. They were drawn from the chronically sick returned from the up-country parties, those with dysentery in particular, from men returning from neighbouring working camps and from Java. In the Changi camp during November the thiamin/non-fat calorie ration was 0.308 early in the month and later only 0.267, a figure indicative of danger. An important radiological survey was carried out by Major Uhr on the patients returned from "F" Force, and others with the diagnosis of cardiac beriberi. The results of this investigation established that most of these men had at that time no radiological evidence of cardiac damage; this was of considerable importance in allowing these men to resume activities such as lay within their physical capacity. In the parties from Java gross malnutrition was common: once again the dietetic needs of these sick imposed a strain on the resources of the hospital. The severe outbreak of B2 deficiency has already been noted. In Changi as in Kranji the level of nutrition was sinking, the dietary position being as bad as in 1942.

HOSPITAL WORK IN 1944

Dysentery was still occurring, and a limited bacteriological survey revealed that the predominant infection was of the Schmitz type. Amoebiasis continued to occur among the hospital patients, showing the wide spread nature of the infection in the camps from which they came: treatment was severely hampered by lack of drugs. Sigmoidoscopy continued to be of great diagnostic and prognostic value, and a room was specially equipped for carrying out this manoeuvre.

Malaria was common among the men from other areas. Atebrin was found to be of definite prophylactic value, in the sense of preventing relapses, and though the stocks were scanty, a true economy was effected by its judicious use. Malarial relapses were steadily decreasing in number. Several deaths from blackwater fever occurred, and one from cerebral malaria.

Surgical work was added to by the unexpected admission of men of British, Australian and Dutch nationality who had been torpedoed while *en route* to Singapore from Sumatra. A strain was thrown on surgical expendable supplies, in particular on saline solution, and the pathological department worked hard with the object of supplying present needs and acquiring a reserve stock of 50 litres. The surgical division of the camp hospital ran smoothly under Lieut-Colonel J. Huston, R.A.M.C.; Majors Nairn and Fagan looked after A.I.F. patients. At the end of 1944 Major Rosson reviewed the work done by the dental service. The paucity of dental material had been remedied to some extent by the manufacture of substitutes of dental rubber and plaster for the making of dentures, and of amalgam alloy for fillings. Necessary materials such as mercury and cements were fast disappearing, and the opportunities of carrying out

conservative dentistry were thus dwindling. Nevertheless, the work done was a notable achievement. In 1943 when the peak of the work was done over 10,000 patients were treated.

MEDICAL CONDITIONS DURING 1945

In Changi early in January 1945 a significant event was the injury, fortunately slight only, of several men in one of the working areas following an air raid. The Japanese though as usual reluctant to supply an adequacy of medical requirements, produced quinine, prophylactic vaccines and other items of drugs, including small quantities of injectable vitamin *B*. They also asked for information about men suffering from ocular defects; of particular interest were questions about present treatment, whether the patients thought anything could be done for them and whether they blamed anyone. Later in the year they required returns of the number of officers who had lost limbs and who had defective vision, and additional information concerning medical officers.

Rations were much the same as before, but a new scale was announced in February, together with a prohibition of pooling of dietaries, by which the A.I.F. had tried to make a fair distribution. It had been hoped that with the dietary additions beriberi might become less common, but there was little fall in the incidence, and some severe cases were seen, including a number with massive oedema. These latter were not regarded as uncomplicated beriberi, for they did not respond to thiamin alone. In the parties arriving from Java severe forms were encountered also, particularly with cardiac affection. Though no substantial changes occurred in the level of vitamin *B* complex in the diet there were some relapses of the "new syndrome" with neutropenia, and towards the end of May there was a sudden increase of lesions of the pellagroid type. This at least showed that there was no connection discernible between these deficiencies and the use of maize flour and black beans.

Amoebic dysentery continued to give anxiety. The maximum amount of emetine allowable for an individual patient was 8 grains; in May the position was slightly better, but even then the total of the drug held in stock was only 136 grains, while in Kranji alone there were over 100 patients needing treatment. The needs of this and other essential drugs were hard to estimate, owing to the continuation of troop movements. For example a party arrived on 25th May from Palembang, numbering 350, and while parties were still leaving for working camps in 1945, returning troops usually called for special attention.

In Kranji an increasing number of men needed special "ulcer" diets, and these were very difficult to supply, particularly as most of the patients also showed evidence of malnutrition. The supply of alkalis for treatment gave trouble, but was helped greatly by the production of magnesium hydrate, which was made in the soap factory from sea water. Dietary difficulties arose with patients suffering from infectious jaundice, as the curtailing of fats caused serious loss of calories. Similar difficulties were encountered in treating patients with chronic amoebic infections, some

of whom weighed only about 100-110 lbs., and needed careful yet adequate feeding.

Malarial relapses gave anxiety in debilitated patients, such as those returned with "F" Force. In some instances epileptiform seizures occurred during the relapses of benign tertian malaria, and a few patients died. No evidence was found of cerebral malaria, and autopsies failed to reveal parasites in the capillaries of the brain. It was thought that the cause of these seizures was often intercurrent disease.

At the beginning of 1945 the thiamin/non-fat calorie ratio was only 0.27, and there were still large numbers of men with beriberi. It was noticeable that men admitted from certain working camps had beriberi of types differing from those seen in others. For example hydrothorax was common in some, in association with general anasarca, whereas in others neuritic types with little oedema were seen. In a considerable number of these oedematous patients well-marked dilatation of the heart was proved by radiological examination, more often involving the left side. Pulmonary oedema was often demonstrable, and was associated with attacks of breathlessness. The clinical picture often resembled that of hypertensive heart failure. The small supplies of injectable thiamin were used on the worst of these patients: in addition they received the special beriberi diet with added rice polishings. The receipt of Red Cross parcels in April improved the ration somewhat for a short time. A further supply of drugs was also received from the Japanese.

The arrival of a working party into the Kranji area made inroads into accommodation space and also labour, as men were required for wiring off the area, and patrolling the boundary. During March 1945 an air raid damaged the piped water supply to the Kranji hospital, making it necessary to fall back on wells. No other damage was done. In spite of the persistence of chronic disease, malnutrition, loss of weight and vigour, and the asperities of life of prisoners of the Japanese, the spirit of the men in hospital remained good. Educational and diversional activities had been a feature of the life in the hospital areas throughout the period, and additional efforts were made successfully along these lines. Knowledge of the turning of the tide of war, gained from the perilous working of radio sets helped the prisoners greatly. But sustaining of the spirit was more difficult in proportion as fatigued and ravaged bodies became weaker. The long years of privation and cruelty were showing their effect in a steady deterioration of the force.

PULAU BLAKANG MATI

References have been made to the physical condition of parties returning from working camps. It is convenient here to follow briefly one working party, which was in a camp on Pulau Blakang Mati, an island south of Singapore Island from April 1942 to August 1945. The party numbered over 1,000 in all, of whom some 250 were Australians. Accommodation was in barracks and good in type, and hygiene was also good. The work was in the handling of bombs, petrol and oil for the Japanese air force. As the Japanese advanced the work grew heavy, but in later times it became

less arduous. During busy times day and night shifts were required for loading ships, and the conditions at the ships were bad. All manner of other special work was also carried out by the party, and long hours were generally worked. The usual conditions prevailed of harsh discipline and violence, particularly at the hands of Japanese privates to whom responsibility was delegated.

In 1942 and early in 1943 deficiency diseases became so common as to affect 25 per cent of the strength, the most frequent forms being those with lesions of the mouth, throat and tongue. Later scrotal dermatitis became common, and rice polishings were supplied by the Japanese and used with good effect. About the middle of 1943 keratitis and amblyopia appeared; the men so affected were allowed to attend the eye clinic in Changi and if necessary to be treated there. At Christmas 1943 the Japanese presented a hundredweight of "Marmite" which was used chiefly for the men with failing sight, and lasted till August 1945. Beriberi was seen to a slight extent only and then in the later period.

Malaria was a major problem after August 1943; in spite of requests the Japanese refused to allow anti-malarial measures to be adopted. Captain Puffett, A.A.M.C. brought a microscope to the island in August 1943 and the exact diagnosis could then be established. Later the microscope could only be used jointly with the Japanese, and after an "incident" it was not seen again till August 1945. Most of the infections were benign tertian. Further representations were made for the making of a survey of the island, which had been free of malaria up to the time of the Japanese invasion. A survey was carried out by the Japanese, but the presence of malaria was denied until the disease appeared in Japanese troops. A more reliable survey by Indian civilians in 1944 revealed anopheline breeding grounds, but only inadequate measures were adopted. Treatment was with atebrin and plasmoquine till atebrin became unobtainable in April 1943, and the scanty stock of quinine was then used. A Japanese order in September 1944 kept malarial patients off work for twenty-eight days and a follow-up course of quinine gave the men a chance to recuperate properly. Later this period was shortened, with correspondingly less satisfactory results. Most of the men in the camp at one time or another had malaria. The camp started with fairly good stocks of medical supplies which with purchases and Japanese issues lasted till the end of 1943: thereafter supplies were unsatisfactory. Dysentery also occurred on the island, and good results were obtained with the small amounts of sulphapyridine available.

Little difficulty was encountered in treatment or evacuation until 1944. General health was fairly good, but loss of weight was common. This was due to a falling off in rations; the scale of issue was in conformity with the customary Japanese scale, but gradually dwindled. Meat, varied by fresh fish, was replaced by dried fish in 1943, and the supply became irregular in 1944. Fresh vegetables were adequate though variable in amount. In 1945 in common with the other camps Blakang Mati camp suffered a reduction of rations, which were inadequate for men doing

hard work. In August 1945, 403 men of average age 29 weighed on the average 122 lbs; most of them lost some 40 lbs. in weight. Gardens were allowed after some haggling, and expanded greatly in output. The garden was an activity of the camp itself and was found to be of the greatest value in the later period.

No Red Cross medical supplies were received, but large quantities of food and clothing came from the South African Red Cross in September 1942. Further supplies came in November from India, and in 1944 parcels were received from the British Red Cross, which were dated June 1942. American Red Cross parcels also arrived late in 1942, and a limited amount again in 1945. Some of the parcels had clearly been rifled before their receipt.

This working party was a good example of one performing laborious work under reasonably good conditions, as judged by Japanese standards: even so the incidence of illness was higher than would have been the case had proper anti-malarial precautions been allowed, and had a proper dietary been available for the whole period.

WOODLANDS CAMP

Woodlands camp was still in being when the war ended. Most of the work was on petrol storage, and conditions and treatment were on the whole reasonable. Rationing was unsatisfactory, and considerable deficiencies in weight were common with rice and other bulk items. The scale of 600 grammes of rice per man per day was never reached, and there was occasionally an acute shortage. The sole source of salt was from sea water from the Johore Straits. Daily rations were most unsatisfactory, as the Japanese kitchen staff only passed on what they did not want. Medical supplies were very scanty, and mostly could only be bought from a Chinese pharmacist. Rice polishings were readily purchased in the rice factory at Johore Bahru.

After March 1943 it was almost impossible to have a patient transferred to Changi for treatment. One man who had a fractured spine was refused transport to Changi until the medical officer slung him from the roof with borrowed block and tackle and successfully applied plaster. The Japanese two days later consented to send him to Changi where he did well.

OTHER WORKING PARTIES

Several working parties were sent out to various places mostly on Singapore Island during the first few months of 1945, and remained at work until hostilities ceased. These were stationed at River Valley Road, Johore Bahru (X.1. and Q parties); Keppel Harbour camp, Jurong Road (X.8. party) and Pasir Panjang (Yokata Tai camp).

Conditions varied in these camps. Some of the work required was heavy, for example tunnelling, digging trenches and making wells. Most of the work was for defensive purposes, and some required the men to work underground with the poor ventilation. Some of the men were still

weakened from their experiences in the working camps in Thailand, and not fit for hard work. Reasonable consideration was sometimes given them, but the rations supplied were inadequate both in calories and in protein for men doing physical work. Hygiene arrangements were usually primitive and unsatisfactory.

Major Stevens, S.M.O. of A.1. hospital reported that a warning was given that recurrences of malaria must be expected; in addition it was recognised by the Japanese that the site was bad and that primary malaria would occur, therefore quinine and nets were issued. In "Q" party quinine was unobtainable by the A.I.F. except by resourceful means from the Japanese hospital. Deficiency diseases were not common, but a few cases of beriberi occurred in some parties, and other *B* complex deficiencies were manifest occasionally. The men in these groups, though affected with the usual diseases of working camps maintained fair health on the whole until relief came: fortunately the period was brief.

Before leaving the subject of medical conditions in the various A.I.F. camps on Singapore Island it should again be observed that the actual and proportional figures for nutritional diseases as seen in the medical units in the Changi area or in Kranji can be misleading because military strengths were constantly changing, and because the men returning there were drawn from areas where there were differences in conditions of diet, work and intercurrent disease. But a perusal of the figures of patients attending the medical inspection rooms and admitted to hospital shows that, while some deficiency diseases were more common and persistent than others, all their clinical forms kept repeating themselves throughout the period. Under the worst conditions severe beriberi and pellagroid states appeared, but lesser manifestations were always to be seen, perhaps not in epidemic form, but yet in a degree of constancy. The so-called "retrobulbar neuritis" was one which demanded particular attention because of its functional importance. At the end of the period there is a clear picture of a body of men, thinned and weakened, only maintained in an unstable equilibrium with difficulty. The last hurdle they had to pass was the final reduction in rations in 1945, and it is probably true that liberation came with a small margin of safety for many of them, in fact only just in time. The A.D.M.S. of the 2nd Australian Prisoner-of-War Reception Group observed that the Changi men looked in worse condition when liberated than those who had experienced some improvement in their diet in the Thailand bases.

The working parties began to return to the central camps by August 18th and on the 19th supplies of Red Cross rations and medical supplies were received.

We now have to leave the story of the camps on Singapore Island and follow the parties who proceeded overseas or up-country, some to exchange one camp area for another, others to a destiny of a very different kind on the Japanese railway that was to link Burma with Thailand.

CHAPTER 26

THE BURMA-THAILAND RAILWAY

1. WORKING CAMPS

WE have seen how a series of parties of troops left the Changi area from time to time for destinations vaguely spoken of as "up-country". Some were working parties on a more expanded scale than those sent to various camps on or in the neighbourhood of Singapore Island; the numbers were considerable. "F" Force for example comprised 7,000 men. Smaller groups were also sent by the Japanese from Sumatra and Java and merged with other working forces. Other parties were purely medical in constitution and function, but all served one end, that of building a railway to link Thailand with Burma. A railway already ran from Moulmein to Ye along the Burmese coastline, and from Thanbyuzayat on this line the new construction was to extend south and east to Bangkok in Thailand, where it could connect with the eastern line to Indo-China. This route presented many difficulties, but its prompt completion was regarded as of tactical importance by the Japanese, as it shortened the line of communication to Burma, which could only be reached by sea from Singapore to Rangoon. The proposed railway was 270 miles (415 kilometres) long and ran through dense uncleared forest for most of the way, with many deep cuttings and embankments and about 700 bridges.

Allied bombing was no doubt expected; it caused considerable damage, particularly in the later period of the war, and many bridges had to be rebuilt, on occasion as many as six times. There was no question of heavy equipment for excavation and construction; manual labour took its place, and the British and Australian troops were used in conjunction with and much in the same way as the large coolie force at the disposal of the Japanese Army. The route passed through dense malarious jungle, with no existing roads, intersected by streams feeding rivers which in the monsoonal season were swollen enough to take barge traffic. This was an important factor in transport, for the engineers demanded that material should be shifted, and that work should go on during the torrential rains of the monsoon. With steep tracks deep in mud, streams to be bridged, ballast to be quarried and walls of rock to be hewn through, the hazards of this enterprise can be imagined. These dangers were immensely increased by the scourges of tropical disease, with a ready reservoir of infection in the coolie population, and with the primitive accommodation and hygiene of the jungle.

"A" Force under Brigadier Varley, was the first party to be drafted for this work, and left Singapore on 14th May 1942. During 1942 the work was in preparatory stages; bases were set up, the route surveyed, roads made, and materials selected. By the time the monsoonal season

of 1942 had ended bands of workers had already established working camps along the surveyed route.

Early in 1943 the Japanese were animated by a more urgent haste, for they had suffered losses of shipping, they were faced with a critical position in New Guinea, and expected an Allied counter-attack in Burma. Therefore the work was pressed on, in the hope of completing it while the monsoon lasted.

As the work progressed and distances became greater the problems of supply and transport became more difficult. This was particularly so after the monsoon broke, for the constant rain lashed tracks into impassable quagmires before the river rose sufficiently to be used by loaded barges. A medical appreciation of the situation would have shown that only by forethought, resource and the earnest application of both therapeutic and preventive medicine could the labour potential of the force be maintained at a level efficient enough to carry on the work with even reasonable thoroughness and speed. But insight and humanity were lacking, as we shall see.

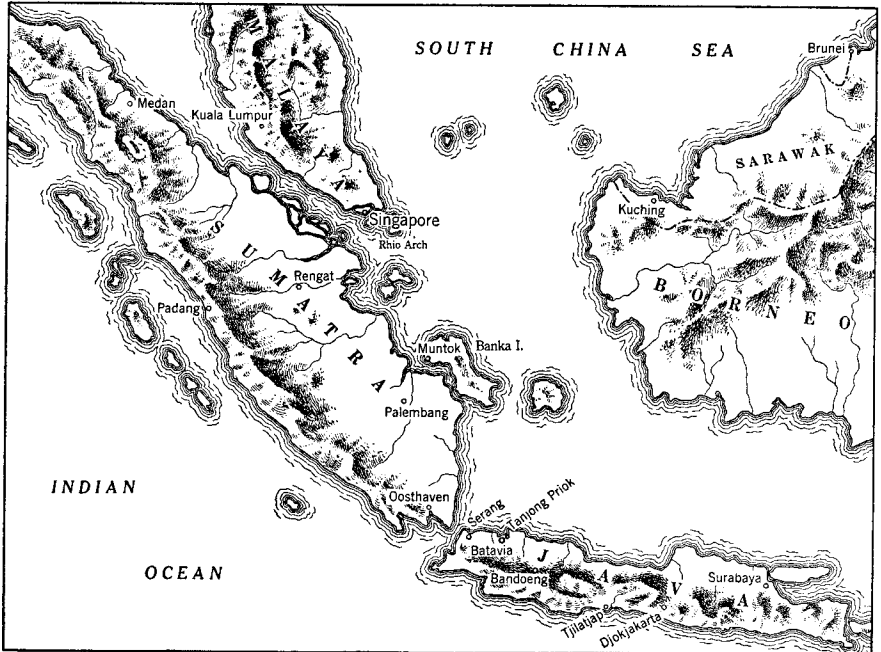
The story of the working forces in Burma and Thailand is presented in serial order as they left Singapore and other areas where prisoners of war were concentrated, and is pursued through the hospital camps and bases where vast numbers of sick were treated and where so many died. The identity of each of these groups was usually not clearly preserved as time went on, as they were absorbed into local autonomous bodies, and therefore the descriptions must be partly regional, following the prisoners as they slowly gravitated from Burma, and the upper and central Thailand camps to the southern bases and finally returned to Singapore or were liberated from Thailand.

LABOUR FORCES IN BURMA

Coates and Party. The first of these parties based on Singapore was "A" Force, but before this was assembled another working party had been formed in Burma whose destiny was mingled with that of the first oversea working party to leave Changi. It is necessary to hark back briefly to the last few days before the fall of Singapore. When the fall of the island was imminent Lieut-Colonel A. E. Coates received an instruction from General Bennett through the A.D.M.S. Colonel Derham, to join a ship carrying certain key personnel, for use in other areas. At the Clifford Pier he boarded the *Sui Kwong*, which under mortar-fire moved away to another anchorage, and at dawn on 14th February passed through the minefield and the Rhio Strait for Java. Coates was the only surgeon and the only Australian among the medical men on board. The ship was bombed twice with many casualties, and after helping Colonel Broadbent rescue many others in the yacht of the Sultan of Johore, Coates arrived at Tembilahan on the eastern coast of Sumatra on the afternoon of 15th February. Here with the help of colleagues he operated on fifteen of the worst casualties and put them in native huts. An emergency C.C.S. was set up, and when the Australian detachment left next day Coates and

MIDDLE EAST AND FAR EAST

others stayed, and in a week operated on some hundred patients, about fifty major operations being performed with primitive instruments. More wounded were brought in a fishing boat from another sunk ship, *Kuala*. On the 21st the medical party went up river to Rengat, and operated in a mission hospital. Lieut-Colonel Hurd-Wood, I.M.S. and Lieut-Colonel Coates went on to Sawahlunto *en route* to Padang, where it was hoped sea transport would arrive for evacuation. There were 130 patients in the native hospital at Sawahlunto, many of them previously operated on by Coates, who stayed there and helped Major Davies with the medical work.



Sumatra and Java.

On 1st March a cruiser called at Padang and embarked a large number of people, but the party at Sawahlunto still awaited transport for over 130 wounded. On 3rd March Coates went to Padang by train and was asked by the officer in charge, Lieut-Colonel Warren, to act as S.M.O. for the wounded. The British Consul at Padang arranged by radio for a ship to come on the 7th. With great difficulty and not a little opposition from local authorities wounded men were transferred to the Dutch hospital at Padang, and on the night of the 7th there were some 1,000 British and Australian soldiers, fifty of them badly wounded, and a number of women, including some nurses and planters' wives. The Dutch Red Cross provided transport to the port of Padang, Emmahaven, but the ship never came. It had been sunk fifty miles from Padang; some of the crew afterwards met Australians in the prison camps of Sumatra. On 17th

March the Japanese arrived. At first they treated their prisoners well, but Lieut-Colonel Coates and Lieut-Colonel Hennessy, R.A.M.C. were the only medical officers left with 1,500 prisoners of war and fifty seriously wounded. Six weeks later Coates went by ship to Mergui in Burma with 500 British prisoners in a badly overcrowded and filthy Japanese transport, *England Maru*. There was a bad outbreak of dysentery on board, but no drugs were available for treatment. At Mergui this party met the part of "A" Force which had left Selarang on Singapore Island on the 14th May 1942.

"A" Force

The medical section of "A" Force included most of the officers of the 2/4th C.C.S., with Lieut-Colonel T. Hamilton as senior medical officer, Majors A. F. Hobbs, W. E. Fisher, J. S. Chalmers, S. Krantz, and Captains T. le G. Brereton, J. P. Higgin and A. J. White; Captains C. R. B. Richards, C. L. Anderson and G. D. Cumming were R.M.Os. They sailed from Keppel Harbour, and on 20th May 1942 arrived at Victoria Point in Burma, where 1,000 men were left with Captains Higgin and White as medical officers. The ship was crowded and filthy: an epidemic of dysentery broke out, and there was little chance of its alleviation. On 23rd May the C.C.S. staff were divided into two parts; one disembarked at Mergui, and the other went on to Tavoy, where a Dutch party from Sumatra joined "A" Force.

At Tavoy the epidemic of dysentery had reached major proportions, and a British and Australian hospital of 200 beds was established. Major Fisher looked after the dysentery wards. Though these were housed in solid teak huts, the water supply was primitive and the hygiene non-existent. Latrines were dug among rubber trees, but the effort to reach them down steps from the huts in pouring rain was too much for many men. Proper sanitation was later achieved through the efforts of the hospital staff, and with the abatement of the epidemic the conditions improved somewhat, though there was gross overcrowding. It was observed that the epidemic flared up again when sick arrived from Victoria Point and Mergui.

An acute fulminating form of amoebic dysentery had been encountered in Sumatra, and this also appeared in Burma. Coates, who had joined part of "A" Force at Mergui, was himself suffering from amoebic infection contracted in Sumatra. Major Chalmers had enough emetine to treat a few patients, but when the supply ran out the only treatment available at Mergui was powdered charcoal from the kitchen. Some twenty men died. Medical supplies at Tavoy and Mergui were almost non-existent, except those brought by the C.C.S. against the orders of the Japanese, who had given an assurance that quarters and drugs would be available. Captain Richards' medical pannier had been looted on the ship.

In July a small medical section under Major Hobbs went with a working party from Tavoy to Ye. Conditions now improved somewhat in both

Mergui and Tavoy, but there were still eighty to a hundred in each hospital, and there had been several deaths.

In August the parties at Mergui and Victoria Point were brought to Tavoy, thus concentrating the force. The medical staff and patients were brought from Mergui in a little coastal steamer after a shocking trip. Work had been continued on the Tavoy aerodrome, and was pressed on with the augmented working party, in spite of the monsoonal rain, always very heavy in this belt. The men suffered from infected sores, especially on the legs and feet, for their boots soon rotted away. They worked six and a half hours a day, and kept reasonably well on a diet of about 2,600 Calories, though this was deficient in protein and fat. In spite of international conventions medical orderlies were set to work on the Tavoy aerodrome.

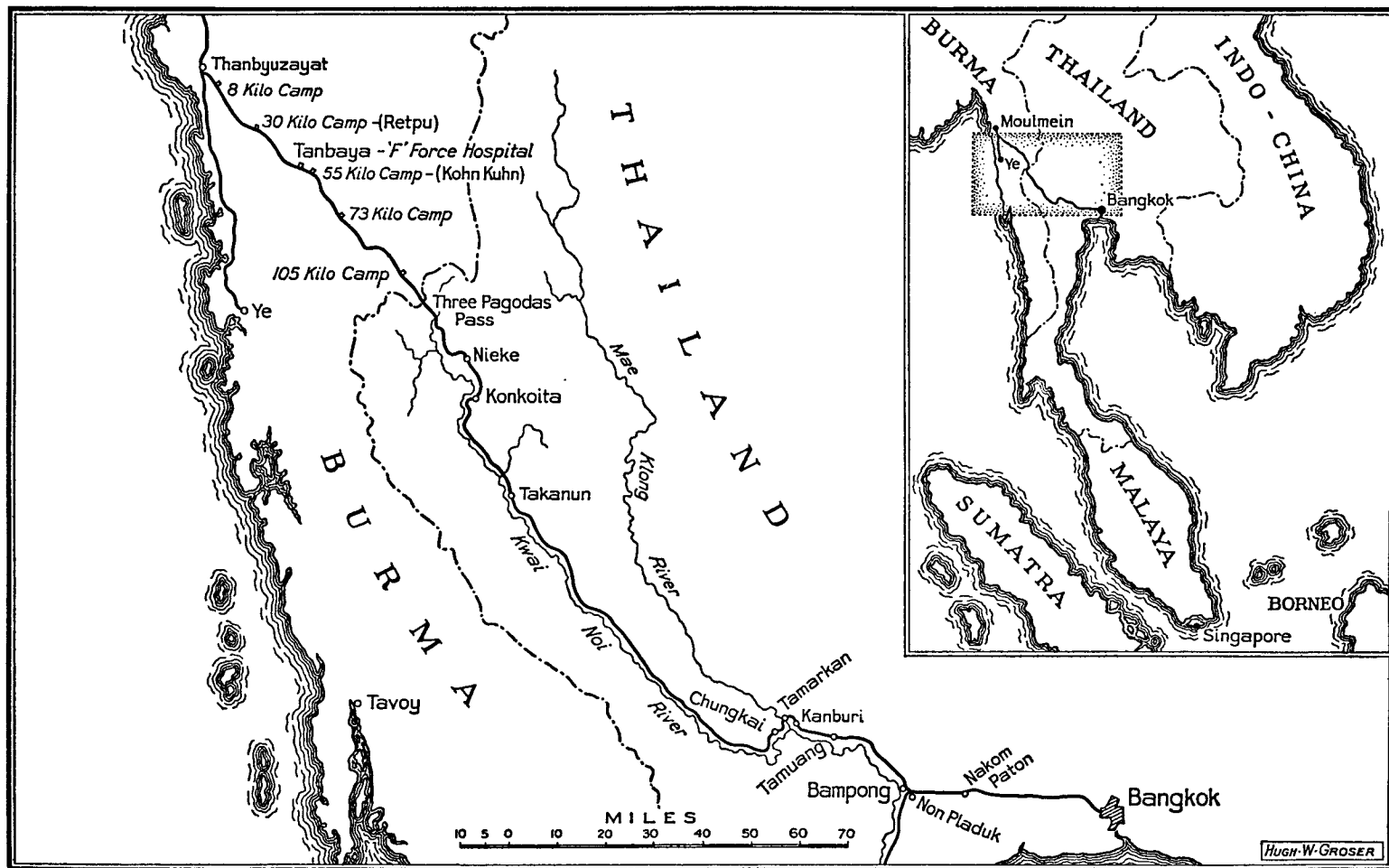
On 30th September the Australians left Tavoy by sea, with the exception of Coates, Chalmers and twenty-five men from the C.C.S. who remained with the hospital and its 144 patients. This journey, for which no rations were provided, took the "A" Force detachment to Moulmein, where the men were loaded into cattle trucks and taken to Thanbyuzayat, where the new railway began. During the next three months further parties of "A" Force arrived from Tavoy, while other parties were sent out working in the jungle from Thanbyuzayat.

There was thus a period of over six months in which "A" Force worked on roads and aerodromes on the Burmese coast, and by degrees collected at the railhead, where parties were being sent out to work in the jungle. The conditions in some of the places already mentioned were fair; in others, like those described in Tavoy in the earlier days they were shocking. At Ye, 100 miles north of Tavoy, diet, though grossly deficient in protein and fat, supplied enough calories to allow some regain of lost weight, and eggs, dried fish, fruit and vegetables such as kachang ijaou, a dried green pea, could be bought. Duck eggs, so useful in many other camps afterwards, were a most valuable supplement. Protein deficiency oedema was common. Accommodation and hygiene were poor, and medical supplies comprised quantities of useless drugs, such as creosote and camphor, but nothing of value. Fortunately sickness was not serious, but malaria and especially dysentery accounted for 180 admissions to hospital out of 500 to 600 men in four months. Tropical ulcer was troublesome, but at first relatively benign in type. Numbers of men treated for dysentery at Tavoy were found to be suffering from amoebiasis. Few facilities existed at Tavoy; the improved state of affairs there was due to the initiative of the men themselves, under medical direction. Surgical amenities did not exist, and when one soldier had an acute attack of appendicitis, Major Krantz operated on him in a Japanese hospital. Even in these earliest episodes of Japanese railway construction camps can be seen evidences of lack of reasonable organisation. The efforts of the medical officers were hindered by inefficiency and indifference, which were matched only by a complete disregard for truth and reliability.

At Thanbyuzayat a base hospital was established. Major Fisher was in charge of the hospital, and Lieut-Colonel Hamilton was senior medical officer for all prisoners of war in Burma. Thanbyuzayat was a place of importance, where there were huge dumps of materials for the railway, and a large Japanese camp and headquarters, with anti-aircraft defences. The hospital consisted of shoddy huts of bamboos, with attap roof. Each hut was nearly 300 feet long with platforms 18 inches from the ground and one 6 feet alley way down the centre. They were overcrowded and infested with vermin. At the end of 1942 the Japanese built a new block with wooden floors and sound roofs. The provision of shuttered walls and mats for beds gave some degree of comfort, but only a yard of space per man was allowed, and the resultant overcrowding, together with the inevitable vermin drove the patients to sleep under the huts. Isolation was not provided except for dysentery. For a time Dutch medical staff looked after all the patients with dysentery in the old wards, by order of the Japanese, but the Australians were glad to have their own patients back again, and apply their own methods of sanitation by which the dry pan latrines previously used in the wards were abolished. Severe types of infection were seen here, and a number of deaths occurred especially in the malnourished, averaging about one a day.

Eadie and Party. At the end of October Lieut-Colonel N. Eadie, who had previously commanded the 2/2nd C.C.S. arrived from Java. Digressing for a moment we may note that in March 1943 he had been taken to a native gaol in Batavia after he had unsuccessfully attempted to arrange for hospital accommodation for casualties resulting from a forced march of prisoners of war at Batavia. This gaol was filthy and 2,000 European prisoners of war were crowded into a space meant for 900 native prisoners. With Captain Goding A.A.M.C., Eadie tried to do something for many men suffering from dysentery, malaria and dengue fever, though hampered by a serious shortage of drugs. A month later some of the Australians, with Eadie and Goding, were transferred to a camp in the city known as "Bicycle Camp" where Brigadier Blackburn had been some time previously. In October 1942 Eadie was sent as S.M.O. with a working force of 1,500 Australians and Americans, who suffered horrible conditions on board ship to Singapore. After a few days at Changi Eadie went to Moulmein in Burma, and became absorbed into "A" Force. He later became medical officer to a working party under Lieut-Colonel Williams.

A small operating theatre was built at Thanbyuzayat in November, in which emergency surgery could be carried out. During January most of the remaining personnel of the C.C.S. and patients arrived from Tavoy, but Major Hobbs was allowed to take a detachment to Moulmein on 18th January to attend wounded who had been on bombed ships. The most seriously wounded were quartered in a church and were well treated by the Japanese, who supplied good beds, good food and sterilised dressings. The treatment received by these sick men proved to be unique in the light



"A" Force—Burma-Thailand Railway.

of later experience. There were other signs that there was danger from the air, from Allied planes, for on 1st March two bombers flew over the camp and dropped flares and bombs some one and a half miles away.

By this time camps were stretching out from Thanbyuzayat into the jungle, and patients received at the base from them showed signs of the strains to which they had been subjected. As the work grew harder, and more exacting with the making of roads and bridges, and driving cuttings through rock, so rations deteriorated. The Japanese were trying to discharge as many patients as possible from hospital, and the guards became more truculent and cruel. At the end of April the Japanese made a propaganda film of the camp, complete with band and concert parties drawn from working camps. The medical officers were not impressed by the mock show of drugs and other equipment on shelves in the theatre, nor the scene of "up" patients parading as sick arriving from the jungle.

In April another large base hospital camp was opened at Retpu also known as 30-kilo camp, 18½ miles from Thanbyuzayat. Lieut-Colonel Coates, who had been working at the base since leaving Tavoy in February, was appointed S.M.O. with Major Krantz as surgeon. In May the Japanese decided that most of the patients were fit for work, and, sending the dying back to Thanbyuzayat, they distributed the rest among the jungle camps.

By May 1943 several important events had happened. The sharp heavy showers of April had heralded the monsoonal rains, which added greatly to the discomfort of workers and patients. In March men in some camps had been inoculated against cholera, but in the middle of May, Captain Richards on entering Taunzan, an "inexpressibly filthy" camp, found bodies of Burmese there dead of a cause unknown. This cause was soon revealed as cholera, and further deaths occurred. Treatment with saline solutions was carried out with a wide bore needle extemporised from "salvaged" copper tubing.

On 12th and 15th June further air raids took place, killing thirteen A.I.F., two British and four Dutch, and injuring thirty more, including Brigadier Varley. As a result next day a number of the fitter patients were sent to a camp five miles away. They had to walk and carry their gear, and on arrival found the camp a mere collection of bamboo huts without even attap roofs to give shelter from the incessant rain. All who could stagger left for previously vacated camps, leaving the stretcher cases at Thanbyuzayat for several days with Fisher and a small staff, who managed to move to 18-kilo camp before further raids occurred; later they went to Retpu. Bombers persistently attacked the camp until the 27th June, and during this time, cholera, which had attacked several of the worse working camps was still a major anxiety. The Japanese made bacteriological examinations to discover infected men, but failed to correlate these tests with the isolation of carriers.

During the early part of the monsoon season the men working in the railway camps faced great risks. It is difficult to understand an organisation which moved men as yet untouched by cholera to camps where native

labourers were dying of the disease, and without attempting any local hygiene, examined men by rectal smears and cultures. Yet the Japanese were genuinely alarmed by cholera, and adopted such measures as building a stockade round an infected area, for the purpose of excluding those who had not been submitted to a futile disinfection. In June cholera in the 60-kilo camp was well under control, largely owing to the efforts of Eadie and Richards, and the men, most of whom had recurrent malaria, were sent to 40-kilo camp which was even worse. Men were driven to work by the Japanese, and Lieut-Colonel Eadie and Sergeant T. O'Brien who refused to let sick men go, were sentenced to a month's imprisonment. Fortunately the sentence was cancelled at the last moment.

Retpu camp had been the site of a convalescent hospital for a short time under Lieut-Colonel Coates; it was now re-opened on 4th July under command of Major Fisher. The 18-kilo camp, to which some of the patients from Thanbyuzayat went after the bombing, was evacuated to Retpu. This was a great relief to the patients, as 18-kilo camp was incredibly bad, with mud or swamped padi fields under the huts, which even with dispersal, offered targets for bombers for which no red cross protection was allowed. Retpu was another deserted working camp; its sanitary arrangements were so bad that the latrines were physically dangerous. Convalescents had little rest as they were constantly occupied in boiling water and sterilising mess gear. The majority of the patients suffered from dysentery, relapsing malaria, malnutrition, and many in addition had tropical ulcers. One advantage of this camp was the proximity of the river, which, with the greater dispersal allowed by the Japanese, was more readily reached by the patients for swimming and fishing. Still another abandoned hospital was expanded to make a large base: this was the 55-kilo hospital camp at Kohn Kuhn, designed to take all the sick from the forward jungle camps. Coates was asked by Colonel Nagatomo and Brigadier Varley in person if he would take over this camp; though ill in 70-kilo camp with tropical typhus at the time he agreed, and was later able to initiate work of great value and ingenuity in this hospital. During convalescence he was carried round to see patients before he was fit to walk. The conditions were very bad: there were eight large bamboo huts roofed with attap, and one small isolation hut, in which one hundred patients with dysentery were nursed. No beds or bedding were provided. Early in July there were 1,000 patients of several nationalities; in a few weeks these had increased to 1,800, with only two medical officers and six orderlies. A month later four more doctors were added to the staff.

Malaria was extremely common, but as most patients with other diseases also had malaria the Japanese did not count these in estimating supplies of quinine, and reckoned for 300 only. There was a small amount of quinine hydrochloride for intravenous use in cerebral malaria, but economy of all quinine was imperative.

Amoebic dysentery here appeared as the scourge it is in its acute destructive form; emetine was almost unobtainable. An extemporised proctoscope was used in diagnosis, with sunlight as the illuminant. The Japanese

medical officer, sceptical of the nature of the condition, ordered the term amoebic dysentery to be deleted from death certificates and "hill diarrhoea" substituted. Autopsy evidence proved its nature, and emetine was promised: at last a microscope was available in October, by which Lieut-Colonel Larsen of the Dutch Army Medical Corps confirmed the diagnosis. Fortunately Captain Van Boxel, a Dutch chemist, made emetine from extract of ipecacuanha, and this was used with complete success.

It was in these early days in Burma that the first attempts were made to alleviate the destructiveness of chronic amoebic dysentery by the manoeuvre of intestinal drainage. In Tavoy Coates performed the first ileostomy of the prison camps for this condition, with complete success, and this life saving measure was repeated in other places on a number of other patients.

Various forms of malnutrition, due chiefly to avitaminosis, had been recognised for some time. Early in 1943 the same sequences of deficiency diseases were seen as those described in Changi, including beriberi, the pellagroid states due to lack of the *B* complex, in particular the so-called retrobulbar neuritis. Already it was feared that numbers of the men with this ocular deficiency would suffer some permanent loss of sight.

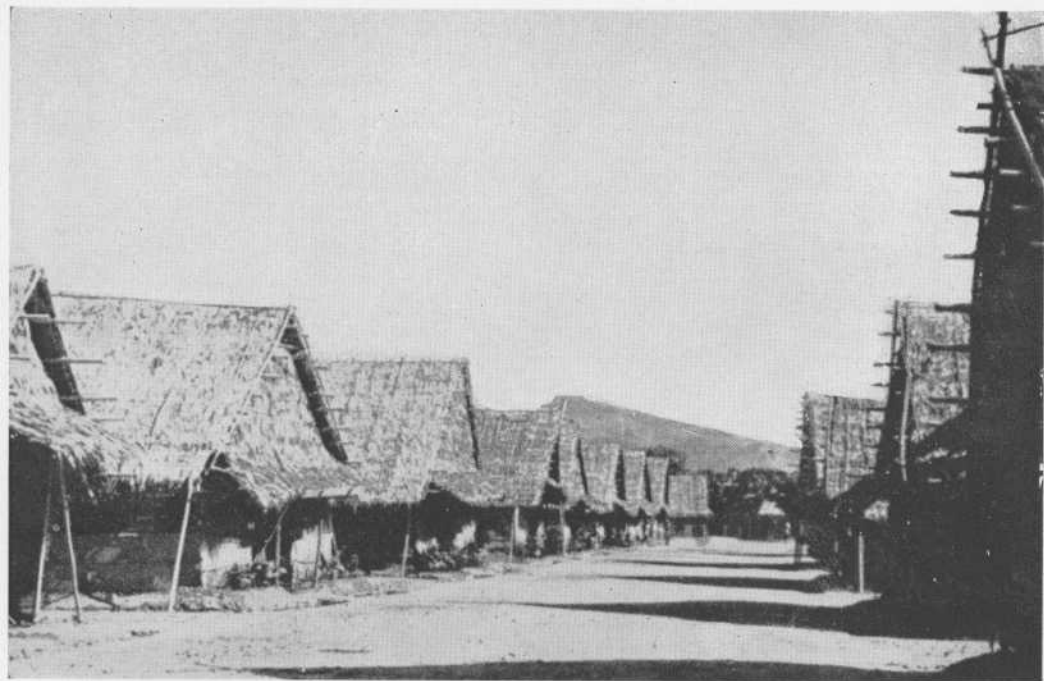
In Burma the pellagroid states were readily recognised once their nature had been established by Fisher's observations at Thanbyuzayat in October 1942. Unfortunately the diet was so inadequate that the clinical hallmarks of serious deficiency were obvious. Angular stomatitis, pharyngitis with dysphagia, painful cracked tongue, usually associated with diarrhoea, and light-sensitive rashes made a clear picture. As in other areas, autopsy often showed atrophic epithelial changes in the hollow viscera. Atrophy of the convolutions of the brain was also found in some patients who had shown signs of mental degeneration before death. The lack of protein and fat was felt severely, and Coates felt justified in consenting to the fund levied from officers' pay being used to buy meat outside the camp. Mr Keith Bostock, a representative of the A.R.C., administered the fund, and the negotiations were conducted with villagers on the initiative of some of the prisoners. Nutritional oedema due to lack of protein was common, the so-called "famine oedema"; when the rare opportunity offered of supplying this deficiency with an adequate ration of meat the response was striking. Oedema was often due to a combination of protein and thiamin deficiencies.

"Tropical" ulcer, as seen in its severest manifestations, was one of the most painful and dangerous common conditions of captivity. There were three chief factors, malnutrition, affecting the whole tissues of the body, and lowering general and local resistance; infection of mixed type and readily propagated under the prevailing conditions, and injury. Even in their lesser manifestations these ulcers were painful and disabling, and in default of dressings the men on working parties strove to cover them with scraps of rag or even leaves. On return to camp the number needing attention was often so great that sick parades lasted till late at night. Even minor abrasions became infected, and particularly in oedematous

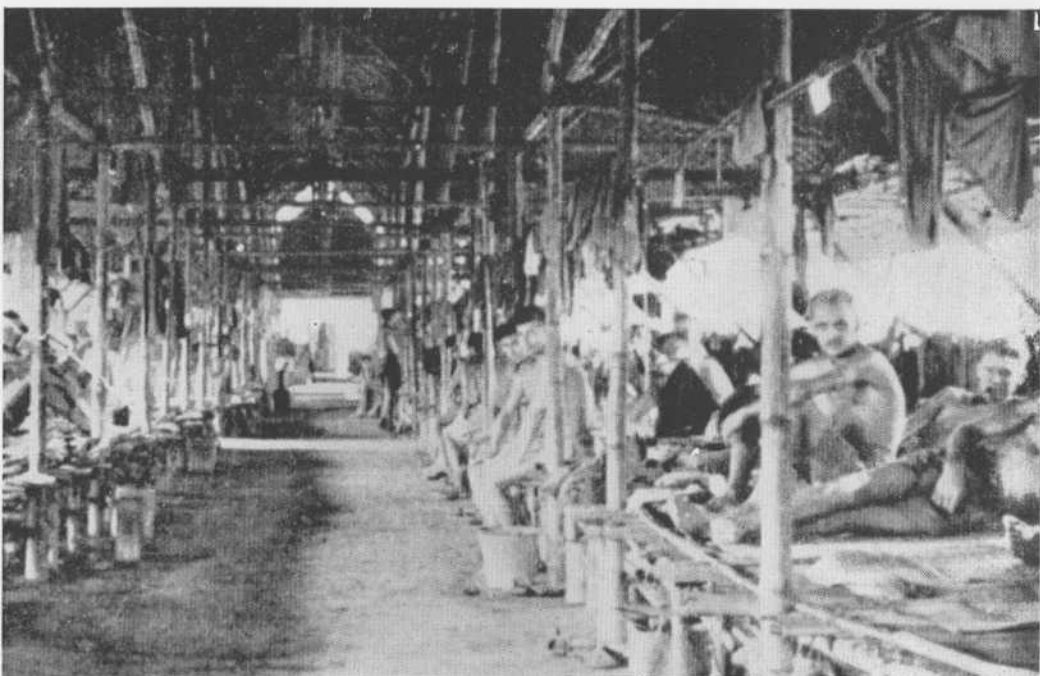
tissue septic and destructive lesions spread often with incredible rapidity. The most usual site was on the lower limbs. The fully developed ulcer had an undermined edge, and extended to the deep fascia, where there was a sloughy base. Once muscle was reached it spread rapidly, and even tendons and periosteum were involved. At 55-kilo hospital over 500 cases were seen. Conservative treatment frequently failed; curettage and the use of iodoform and other applications sometimes gave a good result, but radical excision of necrotic muscle and tendon was frequently necessary. Excellent results were obtained by this last procedure, but when the process had involved deeper structures, such as joints, the pain and disability could no longer be borne: cure was then impossible and amputation was the sole remaining procedure. Coates found that a realistic appraisal of the state of these limbs led him more and more to amputate while there was yet a chance to save life and restore usefulness. One hundred and twenty men were submitted to amputation at 55-kilo camp without any immediate operative mortality. As many as four amputations a day were performed at one time.

One important factor in the production of skin injury in these working camps was the absence of protective clothing. Boots soon fell to pieces, and uniforms ceased to exist. With living reduced to its lowest terms, the men were forced to expose themselves to the repeated traumata of heavy work by day and to ravages of weather during the hours which should have been those of rest. As in all the more or less settled hospital camps, clinical interest was maintained by regular meetings of the staff, much to the benefit of both doctors and patients.

In Kohn Kuhn, at the 55-kilo camp, necessity and ingenuity inspired many improvisations which widened the scope of medical and surgical work. Many instruments were devised to fill the gaps in the very restricted kit available. Beds were provided for the most seriously ill, made from rice bags supported on bamboo frames. All scraps of rag and mosquito netting were hoarded and used for dressings and bandages. Artificial limbs were made from the ubiquitous bamboo, and though these were of the simple pylon type they were used by grateful patients, who were also helped by bamboo crutches made by convalescents. Captain Van Boxel carried out invaluable work in refining and making various substances needed for treatment. A primitive still was used to distil water for eye drops. Tinea paint (Vleminkz) was made from sulphur and slaked lime; this was valuable for both tinea and scabies: an ointment was also used with axle grease as a base. Since spinal anaesthetics were chiefly used a product was made by careful evaporation and dilution of Japanese novocain. A 4 per cent novocain was produced which could be used intrathecally. Procain was also tried, but the oxidised adrenaline in these tablets could be removed only by kaolin, which also removed some procain. In response to a great need, Van Boxel experimented carefully with cocaine: 0.75 c.cm. of a 2 per cent solution proved safe and effective.



Hospital Camp, Thanbyuzayat, Burma.



(Lent by Ex-servicemen's P.O.W. Subsistence Claims Committee)
Hospital Hut, Thanbyuzayat



Rice trucks for carrying thirty prisoners of war.



(Lent by Ex-servicemen's P.O.W. Subsistence Claims Committee)
River barge transporting stores and sick prisoners of war,
Kwa Noi River, Thailand.

Alcohol for surgical use was made by distillation of Burmese "brandy", purchased through the camp commander and interpreter. The percentage of methyl alcohol was apparently low, but a specially prepared fraction of pure alcohol was used for sterilisation of syringes. Disinfectants were soon exhausted, but a weak solution of salicylic acid, a prepared cresol, methyl violet in alcohol, and 1 per cent flavine were found useful for different purposes. Surgical catgut was one of the most useful substances made. After experiment the serous coat of intestines of cattle was found to yield an elastic thread of reasonable strength. Sterilisation was difficult; finally a method of fractional heating in the kitchen fireplace was evolved, and though an irreplaceable thermometer was broken the temperature could be judged with sufficient accuracy. The dried gut was kept in a jar and placed in 5 per cent iodine solution before use. Among other drugs prepared were sodium citrate, acetic acid, calcium chloride, and emetine. In making emetine half-used ampoules of Japanese ether were used with sodium carbonate and alcohol to release the emetine from liquid extract of ipecacuanha. The technical difficulties were overcome with great ingenuity, and an active product was prepared, suitable for intramuscular injection. Finally, precious glass syringes which had been broken were made usable again.

During the height of the monsoon the men suffered great discomfort. Diet was poor, 300 to 500 grammes of rice with meagre amounts of greer stuff, but an unexpected gift of tinned milk was a great help. The Japanese hounded sick and well to work; in one camp 200 out of nearly 900 men were demanded; only 50 could be produced though but 30 of these were fit to work at all. Jaundice appeared in some jungle camps; its cause was uncertain. By comparison Retpu, to which a number of these sick were sent, was a much better camp. In several of the camps cases of sudden death were recorded. Little warning was given, and after a few minutes of breathlessness and cyanosis these patients died from cardiac arrest. Cases of this kind were seen in all areas where serious deficiency of thiamin existed.

As the year went on the working camps of "A" Force stretched out some distance from the Three Pagodas Pass, and well over the Burma-Thailand border. In some of these the Japanese paid the men in Burmese currency which was of no use in Thailand, and as there was no money to buy supplements, diets were accordingly bad.

In October 1943 the railway was completed and "A" Force made contact with "F" Force at Nieke. Retpu was evacuated to 55-kilo hospital camp, and the additions to the medical staff were welcome, to deal with increased numbers of patients. Casualties occurred among the orderlies, who were doing excellent work; several suffered septic ulcers from men in the wards, one lost a limb as a consequence. Two hundred and twenty men had died so far in Kohn Kuhn. The food became steadily worse, yet it was difficult to persuade the Japanese to recognise Red Cross representatives. In these circumstances the prisoners of war could not but feel

cynical when at a Remembrance Service ordered by the Japanese, Lieut-Colonel Nagatomo addressed the spirits of the dead.

At the end of November 1943 a move of the hospital to Thailand was proposed, and Major Fisher and other officers were consulted about these proposals. Four categories of patients were recognised (1) seriously ill for a hospital near Bangkok (Nakom Paton), (2) lightly ill for Kanburi, (3A) healthy men in two categories, (3B) men left in Burma for maintenance. Reports confirmed previous accounts that the food was worse at 105-kilo camp and others in the neighbourhood than at 55-kilo, where hard work was being carried out on 3,000 Calories, chiefly derived from rice. On 19th December the advance party of 200 left 55-kilo camp with two medical officers and eight other ranks of the C.C.S. The last of three groups left on 24th December and arrived at Tamarkan in Thailand on the 28th: eight stretcher cases or thirty to thirty-five sitting patients were put in each truck, and though the nights were very cold only one thin blanket was issued per man. Three men died during the journey, which occupied four most trying days. Eventually all the prisoners of war in the working camps and hospitals at the Burmese end of the line were evacuated to the Kanburi area, with the exception of some 500 left in workshops for maintenance work.

Lieut-Colonel Hamilton in summarising the position at the close of 1943 estimated the sick rate in the jungle camps remaining in Burma as between 50 and 70 per cent. About 1,500 Australians with some Americans and Dutch were in the main camps, such as that at 105-kilo, and small parties of about 200 men were scattered along the line from Moulmein to the border of Thailand. All camps had at least one medical officer and two orderlies, who regardless of their own condition, worked in the interests of the men, ably taking responsibility which in itself was a burden for officers of junior status. Dental work was also carried out even in outlying camps; Captain S. T. Simpson of the 2/4th C.C.S. worked with an orderly, Private W. Fysh, with only a pannier of supplies, and in addition assisted with anaesthetics and oral surgical cases at Thanbyuzayat.

The further story of "A" Force after the move south to other concentration areas must now be left for the present, while we follow the movements of the other forces which made their way up from the southern end of the line.

LABOUR FORCES IN THAILAND

(a) UPPER THAILAND GROUP

"F" Force

On 8th April 1943 the headquarters of Malaya Command was informed that "F" Force, a working party of 7,000 British and Australian prisoners was to leave Singapore shortly for an undisclosed destination, optimistically described by the Japanese as "health camps". The Japanese on being informed that there were not 7,000 medically fit men in the Changi area,

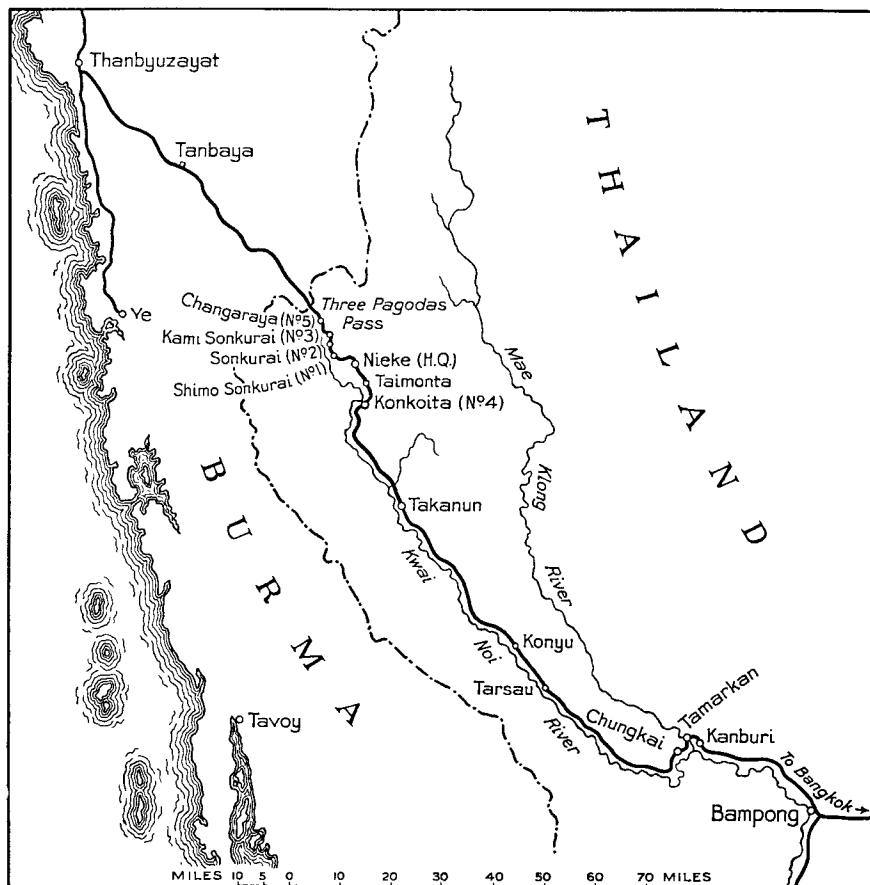
told Lieut-Colonel Harris, the force commander that 30 per cent of the men need not be medically fit, as it was not a working party and conditions would be good. The A.I.F. quota of men was 3,600, and contained at least 125 men who were still suffering from the effects of illness and therefore unfit for work. All ranks were tested for infection with dysentery or malaria, vaccinated, and inoculated against plague and cholera. So short a time was allowed for the selection and preparation of the force that only the first injections of plague and cholera vaccines could be given. A request that a representative of the Red Cross should be sent was nullified by refusal to grant recognition or funds. Three months' medical supplies were sent from the scanty reserves held in Changi. A distribution of reserve boots and clothing came too late to benefit the A.I.F. Lieut-Colonel C. H. Kappe was the A.I.F. commander of the force, Lieut-Colonel J. Huston, R.A.M.C. was S.M.O. of the combined party, and Major R. H. Stevens the S.M.O. of the A.I.F.

The Australian detachment occupied the first six of the thirteen train loads that left Singapore, beginning on 18th April. The men travelled in steel rice trucks ventilated only by central sliding doors; in these trucks measuring 20 feet by 8 feet were placed twenty-seven or twenty-eight men. Most of the stores were also loaded into these trucks. The heat was extreme, only a few could lie down at one time, or even sit with any comfort. Fortunately the men had three days' rations, as meals were meagre, comprising rice and thin stew, at long and irregular intervals. No sanitation was provided, and once over the border Japanese police would not permit men off the train, except at infrequent stops. Drinking water was strictly limited and washing was allowed only once in five days. On arrival at Bampton the men had to carry their equipment and stores nearly a mile to a staging camp. Here each train commander was given a copy of "Instructions for Passing Coolies and Prisoners of War", and the parties were informed that they now had before them a very long march to their concentration area.

The staging camp was a collection of four filthy huts in a fouled area, which needed a day and a half to clear. The only water supply, drawn from a filthy well, was barely enough for cooking and one filling of water-bottles. The men sold much of their clothing and other belongings to the Thais, and bought food. The valuable camp gear and stores were left unguarded by the Japanese, with the result that much was lost by looting by the native population. In this way there were serious losses of personal effects and medical stores from the first trains. Even much of the stores left in a dump at Bampton could not be brought on by lorries on account of the imminent breaking of the monsoon. Exhausted by the long discomfort of the train journey the men now had to begin a march of at least 170 miles.

The marching was done at night, but the humid heat was almost as great as by day. The first stretch of metalled road on the seventeen mile stages to Tamarkan soon degenerated into jungle tracks, which the first rains of the monsoon beat into slippery mud. The fatigue of the men was

evident in the almost shadeless burning sun the next morning, when check parades were held and men detailed for the necessary camp duties. The hiring of ox-carts and other vehicles for carrying some gear and stragglers had helped them along the last miles, but there was worse ahead. A day's rest was a relief after the fifteen mile stage to Kanburi, even though the only water came from a dirty well and was sold at five cents a bucket. Further medical tests by the Japanese took place here, and more inocula-



"F" Force—Burma-Thailand Railway.

tions, medical equipment was divided up for portorage by the parties, sick were attended, and that night the march went on. So night after night the force struggled on, sick and stragglers increasing in number, some collapsing and carried on stretchers, the gear of the weaker men carried by others, except now and then when ox-carts could be hired. Through Wanye to Tarsau they marched and there met men of "D" Force, who had left Chang in March. "D" Force had its headquarters at this camp,

which was extensive, and here had a bamboo hutted hospital where determined attempts were made to leave sick who were unable to proceed. Though the Japanese medical officer agreed the Japanese N.C.O. in charge refused to leave any but a few, and after altercation assaulted Majors Hunt and Wild, injuring the former's hand.

From Tarsau the sick had to be helped along the muddy road, now running through hilly country. Sixteen miles beyond Tarsau Lieut-Colonel Huston, S.M.O. of "F" Force, was ordered to form a wayside hospital for those falling sick *en route*, using the medical panniers. He asked that permission might be given instead to go on ahead and arrange accommodation in advance for the sick, but this was refused. The only shelter available was the rat-eaten lining of a marquee, under which men were cared for as well as possible after the night's long march. When the force reached Konyu shortage of rations was encountered for supplements could no longer be bought. The food supplied consisted of inadequate quantities of rice and watery stew. Stage after stage was painfully passed, night after night, and after the fourteen or fifteen miles of effort the men would collapse on the featureless clearings which were little better than a camp in name, and try to rest. Frequent check parades were held by the Japanese guards, and there were always camp fatigues on cookhouses and latrines. At Brancali harsh conditions were met, and the difficult country ahead had hazards for the marchers in slippery bridges and embankments, where numbers were injured by falls. Many men had sores on the feet and legs, and still more had dysentery.

At Takanun the bivouac site was for once clean and pleasant with shade and running water; Konkaita was really the only area where there was a staging camp. The A.I.F. troops were finally halted at a series of five jungle camps in the Nieke area, spread out over a distance of some thirty miles. Those whose destination was Sonkurai, the farthest north camp of the group, had by this time marched 185 miles. Many men had to be carried or helped over the track, and most men carried another man's gear as well as their own. After seventeen exhausting nights with occasional rests, followed by days of discomfort, the first elements of the force reached Konkaita. Lieut-Colonel Harris, who had been sent ahead with the Japanese commander met them there, and tried unsuccessfully to obtain better rations and conditions. Lieut-Colonel Pond's party of 700 men arrived at Konkaita at the same time, 9th May 1943. This party was one of the train parties which was self-contained; it was under the medical care of Captain R. M. Mills, A.A.M.C. The camp at Konkaita was filthy, and it was impossible to walk about without fouling one's boots with excreta. The Australian quarters were close to the coolie lines: coolies were lying dead in blood and mucus, and a high death rate was reported. On 16th May the party joined its advance section at Upper Konkaita, to find that Major Stevens and Captain Hendry had been sent north to cope with cholera at Nieke. There was no longer any doubt that cholera had broken out among the native labourers, and that it was spreading to other camps. On the night of the 16th the monsoon broke

in earnest, and constant rain poured down, not to cease till at least September. Dysentery and malaria were rife; within a month it was estimated that 90 per cent of the force had malaria.

From their arrival at the working camps the troops of "F" Force were driven mercilessly by the Japanese engineers to laborious work, such as pile driving in water up to their waists. During the march there had been daily battles with guards who forced sick men to march on, and violent assaults on the persons of officers and men trying to protect them. Similar conditions prevailed in the working camps, and sickness multiplied.

Certain factors in the administration intensified the difficulties which beset the special "forces" brought from Singapore Island. Construction of the railway had begun simultaneously at each end of the route, at Thanbyuzayat in Burma, as we have seen, and at Non Pladuk, near Bامpong on the railway line to Bangkok. Non Pladuk was a base for workshops and engineers throughout the construction work, and a camp hospital was maintained there. From the two ends the north and south sections pushed on till they met in the middle. The headquarters of the force working on the central camps was at Nieké. "F" Force had been already sorely tried by having to reach these working camps by an arduous march, immediately after which the men were thrust ill-nourished and weary into work beyond their capacity. Like "H" Force and other reinforcement parties drawn from Singapore Island they remained under the administration of the Japanese in Malaya. Remote, and largely at the mercy of the Japanese engineers who, without regard for life, wished to push the railway through in the height of the monsoon, these men had separate medical and hospital arrangements. These arrangements were crude and insufficient in the extreme, and "F" Force, working northward up the string of working camps, was dependent upon the meagre medical supplies held by their own medical personnel, such still more meagre replacements as they could wring from the Japanese, and such makeshifts as they could devise.

The working parties, already menaced by malnutrition and overwork, were further endangered by the proximity of a civilian labour force. This force consisted of coolies, Tamils, Chinese, Malays and others, who were recruited by the Japanese early in 1943, allegedly for contract times, usually for six months. The morbidity and mortality amongst them were very high, and we shall later see what arrangements were made for their welfare. Notoriously lacking in any notions of hygiene, they were a constant source of infection with bacillary and amoebic dysentery and cholera. Once the Japanese could be persuaded that cholera had broken out their alarm took scientific form, with the use of anal swabbing and cultures, and inoculations, and care in sterilising their own soldiers' mess gear, but these measures were negated by a complete sanitary breakdown. As Captain Mills with Pond's Party remarked, a bamboo fence between the main camp and the neighbouring coolie quarters was not respected by the cholera vibrio or by the flies.

On 10th May Colonel Banno arrived by lorry at Nieke with Lieut-Colonel Harris. At this headquarters camp there was then no shelter at all supplied for the prisoners of war. Within the next week detachments of "F" Force arrived, and frequent thunderstorms, yielding to steady rain added to their discomfort. The "F" Force troops were distributed between Changaraya and Konkoita: the British were concentrated in Sonkurai and Changaraya, the A.I.F. were in Shimo (lower) Sonkurai, Kami (upper) Sonkurai, Konkoita, and the headquarters camp at Shimo Nieke. Scattered down the southward road were between 500 and 600 Australians, some drivers and cooks, others were sick, and others had died.

The breaking of the monsoon coincided with the realisation of the position about cholera. Captain J. L. Taylor, A.A.M.C., made a definite diagnosis of five cases of cholera on 15th May. Colonel Harris immediately urged Banno to establish an isolation hospital, to complete the inoculation of the force, and to prohibit further movement of uninjected men into Konkoita and Shimo Nieke camps. Though a hospital was started and the Japanese produced cholera vaccine after ten days, no attempt was made to limit movement up the line. The British and Australian medical officers did their utmost to maintain isolation at Nieke and to treat the sick, but inevitably cholera spread to the other camps.

By 19th May further inoculation of the troops had been begun and was completed on the 25th, but no appreciable immunity appeared to be conferred till the beginning of June. The wave of primary infection due to the first contacts produced a number of deaths, but by the time this was subsiding, late in May, better isolation and improved hygiene were achieved. In particular, kitchens, mess gear, personal hygiene and safer sanitation were given close attention. There was at first a feeling of despair creeping over the men, but the spirited encouragement of the responsible officers and the candour with which the position, with its risks, its hopes and its duties was put before the men kept the corporate spirit of the affected camps at a high level.

At the end of May a remonstrance was addressed to the Japanese who agreed that work should cease for three days, but did not keep this agreement, though at that time ninety patients were in hospital with cholera and fifty-three had died in one camp alone. Attempts to bring Lieut-Colonel Huston forward also failed, though he was ultimately permitted to join the main force, after six weeks delay and then was not allowed to bring medical stores with him. Stevens remained at Shimo Nieke in charge of the base hospital, and Hunt and Taylor with British and Australian volunteers went forward from Konkoita to deal with the growing epidemic.

The conditions at Shimo Sonkurai during the epidemic may be described as typical of those prevailing in the working camps where cholera had to be treated and controlled. The secondary wave of cholera began on 24th May owing to infection in the camp. Tests made by the Japanese revealed 53 carriers among 250 apparently healthy men. The camp was hutted, but the huts were roofless, and its layout was such that spread of infection was almost inevitable, as the latrines were situated above the

camps. There was great scarcity of tools for constructing new latrines or drains to cope with the flooding from incessant rain, and the tired men had little energy.

In the small isolation hut treatment was standardised. All care was taken to keep the patients warm as far as possible, fluids by mouth were forced, and saline was administered intravenously wherever practicable. Though it was necessary to use boiled creek water for making saline very few reactions were encountered. Over 200 cases were diagnosed here as cholera and Major Hunt was sure on clinical grounds that another 200 men had mild attacks which otherwise would have been regarded as dysentery. "Cholera Hill", as the isolation hut was called, was put under the personal care of one medical officer, Captain R. L. Cahill, with assistance when required from Major Hunt or Captains Taylor and Juttner. Lance-Corporal K. R. Marshall and Private A. E. Staff with other orderlies and volunteers did much to provide the patients with a devoted standard of nursing care. The death rate was naturally high, but was below 50 per cent, 101 out of 209 men, and when the estimated mild infections are included it was approximately 25 per cent. Twenty-three men associated with the medical work of this epidemic died; only three of these were members of the A.A.M.C., the remainder were volunteers. No medical help was given by the Japanese; indeed it was only after vigorous pressure that consent was given by the Japanese camp commanders that men would not be taken from hospital for working parties.

By the end of June cholera was under control in the camps north of Nieke. The Japanese made periodic tests by culture, and directed that convalescents should be kept in isolation until four anal swabs had given no result on culture. In Shimo Sonkurai the last case was seen on 29th June. It was at this time that the establishment of a hospital in Burma was suggested, nearer the head of the supply line. Hunt visited a number of the forward camps early in July with the Japanese commander, and was able to assist with some of the local medical problems in the light of his experiences in Shimo Sonkurai. He discussed the project of a new hospital in Burma with Lieut-Colonel Harris the force commander, Lieut-Colonel Hutchinson and Major Stevens, the S.M.O. In view of the shortage apparent in the Sonkurai-Nieke area the establishment of a hospital farther north seemed to have some advantages. After a struggle approval had been given for the forming of a convalescent section of the hospital at Shimo Sonkurai; this enabled men recuperating after illness to do some light work and to draw a slightly less poor ration.

While the proposition of a purely hospital camp was under consideration local conditions in the working camps had deteriorated even below the previous low level. We may digress from the story of the movements of "F" Force and its components to gather some picture of the privation and hardships suffered by these men. The country was difficult, the only roads were but tracks, and even on occasions when ox-carts or other vehicles were available for the transportation of gear, man-power was often necessary also to push the vehicles through thick mud. The height of

the monsoon was approaching. Nothing was dry, and working parties were often not allowed to return till after dark and even till late at night. A walk of some miles was not uncommon from the place of work to the camp, and then the weary men washed themselves as best they could, had the meagre evening meal, and in wet clothes and a damp blanket, if they possessed such things, sought such sleep as was possible. Sick parades often went on till late at night, and little could be done to alleviate the diarrhoea which frequently made continued sleep difficult for the sufferers and their companions crowded together in a leaky shelter. Dressings for ulcers were almost unobtainable, so too were most essential drugs. The work demanded was usually laborious, and most of the men were totally unused to it, and unable to cope with it in their malnourished state. Bridge building, road making, cutting away rock or laying stones or logs, and digging drains were exacting forms of labour. The engineers were usually ruthless in their demands, and violent in their treatment of those workers who could not keep up the desired pace. Men showing resentment or interceding for sick or tired men were often assaulted, so too were officers who were on occasion made to stand to attention for many hours as a punishment. Officers were also often sent to work; they were in any case usually employed on the tasks of the camp. Endless arguments went on about sending sick men to work, but even a partial success was a triumph for the medical officers.

Clothing was by this time fragmentary; some men possessed nothing but a loin cloth. Few men had boots that could be worn with any advantage, and replacements were grudgingly given by the Japanese. Vermin, the "minor horrors of war" were common, even in those who had opportunities for washing. Scabies was troublesome in some places, and difficult to relieve except when the appropriate treatment was to hand.

Rations were poor and insufficient. The same story was endlessly repeated; a diet poor in protein and fat, and deficient in vitamins. Occasionally fresh meat was provided, from poorly nourished cattle or yaks, and green vegetables were supplied in part from local substitutes when practicable. The best commentary on the diet in these camps is the commonness of deficiency diseases, in particular beriberi and the various syndromes associated with lack of the elements of the vitamin *B* complex. Emaciated and oedematous men were common sights, not merely in the hospital wards but in the working parties. Medical stores were lamentably deficient. Sometimes necessary surgical dressings or essential drugs like sulphonamides, or quinine, or iodoform were issued, but never in quantities reaching adequacy for the needs. The education of the force in the practice of hygiene was difficult to accomplish and maintain in such conditions of misery, but discipline was never relaxed in important matters, and there was excellent liaison between the administrative and medical sections of the force.

Camp hospitals have been described already. It is difficult to free the mind of illusory pictures about such establishments. More extemporisations were possible in fixed bases; in most of the camps it was most difficult to

supply any degree of comfort to men lying on bamboo platforms in long huts, unlit at night save by fires, which were hard to keep going on account of shortage of firewood. The provision of water either hot or cold was a labour; the distribution of meals in exceedingly scanty containers was still more trying. Nursing procedures difficult by day were doubly difficult at night. Evacuation of the sick to other bases was occasionally possible; at the height of the monsoon sick were sent down the river in boats or barges to Kanburi hospital, and were often subjected to hunger, exposure and neglect during transit.

Though figures do not convey the true physical state of men who were required to work, the following table of particulars from some of the camps is presented. It should be remembered that all the labour required for the camps, including carrying water, collecting and cutting firewood in the jungle, sanitary duties and general maintenance had also to be done often by men who were really not fit for work:

Camp	Date	Total Camp Population	Number Sick	Number demanded for work
Shimo Sonkurai	19th July	1,850	1,350	345
Takanun	mid July	564	404	160
Sonkurai	28th July	1,300	1,050	280
Kami Sonkurai	16th Aug.	1,670	1,075	450

Something more may now be said about the clinical aspects of illness in the working camps of "F" Force. The tragic episode of cholera in the first few months killed 650 men of the force; it was remarkable that more did not die and that the epidemic was stayed comparatively soon. Other diseases not only seriously undermined the already low resistance of the men but also killed them in numbers. Dysentery both bacillary and amoebic, dietary deficiency diseases and malaria competed for the first place as destroyers, and to these must be added tropical ulcers. Few, if any, men suffered from a single malady.

Malaria began before the end of May; the infection had been acquired in the staging camps, and experience soon showed that the camp sites were usually hyperendemic areas of infection. A survey of the Shimo Sonkurai area showed free breeding of *A. maculatus* and *minimus*. The prevailing type was malignant tertian, but it was evident that benign tertian was present, though temporarily in a subservient role, for relapses soon became widespread, and caused much anaemia and invalidity. Captain Wilson, R.A.M.C., was able to confirm the types by microscopic examination in July. He also confirmed the clinical conviction of the medical officers that amoebic infections were common, and found 25 per cent of stools examined contained the *Entamoeba histolytica*. It is certain that the actual incidence was much higher; possibly it reached 75 per cent of those infections of chronic type. Bacillary dysentery responded

well to sulphapyridine when this was obtainable. Hunt found that in the malnourished men the outlook was much better when they were urged to consume all their food ration. He found that in camps where calories were not wasted, even though a dysenteric infection existed, the death rate was much lower.

Deficiency states appeared early in "F" Force. The arduous march imposed on the men at the outset, with their immediate employment in still harder labour, rapidly reduced their existing low level of vitamin B1, and thus precipitated an outbreak of beriberi within the first two weeks of their arrival. Fortunately a good supply of beans was obtained at the time, and the disease almost disappeared. But the physical and chemical drain of dysentery and cholera reduced the reserves again and a fresh outbreak of beriberi occurred in which oedema was frequent, and neuritic signs, though less common, sometimes appeared with striking suddenness. Seven deaths occurred from acute cardiac beriberi (*shoshin*). Other disabilities also appeared owing to deficiency of the other components of the vitamin B complex, though these were not severe. Pellagroid lesions of the skin attracted attention when exposed to bright sunlight after the rains slackened in intensity. Amblyopia was not uncommon; its intensity and seriousness could not well be estimated at the time. Stevens reporting on the dietary position in "F" Force on 12th July 1943 stated:

The present ration scale of this force is viewed with the utmost concern by the medical officers. The present scale is entirely deficient in vitamin B, protein and calcium, and if persisted in will result in the rapid deterioration of the health of the, at present, moderately fit men, and the impossibility of recovery of the already sick. My appreciation is that on the present scale the force will be totally incapacitated in one month's time, and that the death rate will be extremely heavy.

He laid down the necessary additions for a reasonable diet; these were rice polishings 2 ounces per man per day, towgay 3 ounces, beans 3 ounces, cooking oil 1 ounce, meat or fish 4 ounces and whitebait 2 ounces.

The value of curetting with the application of iodoform, when obtainable, was established in tropical ulcers, provided the necrotic process had not advanced too far. Surgical facilities were very limited in these camp hospitals, but with the small resources at hand and even with the risks and difficulties of operating in semi-open shelters, emergency procedures were carried out.

In July the work on the railway was being pressed on and the north and south sections were rapidly approaching the centre of the route. The headquarters of the Nieke group of camps was then shifted to Sonkurai. The decision was announced to the force command that a hospital would be set up in Burma to take up to 2,000 patients, particularly those who were not likely to recover in under two months, and those having permanent disabilities and unfit for hard work. Lieut-Colonel Hutchinson, R.A.M.C. was appointed as administrative commandant, and Major Hunt, A.A.M.C. as hospital commander. Arrangements were made for the medical staffs of the camps to select patients suitable for transfer; it was

realised that enough men would be needed who were capable of doing the camp work, therefore an appreciable number of semi-fit men were included. After a characteristic change in decision, postponing the scheme indefinitely, Lieutenant Saito, who had been appointed as Japanese commandant of the new camp, instructed Hunt to accompany him immediately to inspect the site. After twelve hours' notice on 30th July 1943 the advance party left and marched to Changaraya. The advance party included Major Hunt, Captains F. J. Cahill, S. S. Roberts and F. E. Stahl. The Japanese plan was for 1,250 patients to be drawn from Nieke, Shimo Sonkurai, Sonkurai, Kami Sonkurai and Changaraya and that these would proceed by scheduled flights.

Tanbaya. The advance party reached Tanbaya, the site of the new hospital, on 3rd August, part of the distance by motor transport, part on foot in pouring rain, as a bridge had collapsed in a flood and the railway was not working. This was an arduous journey, made more so by the necessity for preparing huts at staging camps for the patients. This work should have been already done by the Japanese.

The Japanese had planned to move 250 men in a series of flights, by motor transport, with three nightly stages along the route. Only eight medical officers were permitted to be assigned to the hospital, with 130 other ranks and an administrative staff of four officers and five other ranks. The camp was on the site of an old camp. Only one hut and the cookhouse were roofed when the parties arrived. The plan provided seven huts each over 300 feet long with attap sides and roof, and a bamboo platform wide enough to take two men, with a gangway along one side. Each hut was supposed to accommodate 200 patients. A smaller hut had a central gangway and held 80 patients. Eventually the hospital had nine wards for patients, and huts for officers and stores and for those concerned in administration. The actual site was reasonably high and dry, and was intersected by the railway line. There was a good water supply. Heavy tasks were imposed on the staff, as there were no tools, except one axe brought from Thailand, and medical personnel had to draw and carry rations. Cooking utensils were never fully sufficient; the shortage of all containers meant that meals were spread over a long period of time, but the force headquarters sent up a number of additional containers which eased the problem. The latrines provided at first were open trench types, and had already been used.

The transfer of the patients to Tanbaya was at last accomplished after irritating delays and muddling; it was not completed till September. As it was a hospital camp and not associated with a working camp, and as the Japanese promised that no man would be taken from Tanbaya hospital for work, better results were expected. The outcome was, however, depressing; the death rate was appalling, as 660 men died out of 1,924 up to the end of November 1943. This was, of course, largely due to the poor physical condition of the men when transferred to Burma.

When the rains ceased a serious difficulty arose, failure of the water supply. The cookhouse was moved near a stream at the opposite end of the camp, but this failed too, and the kitchen was again moved near the main stream. With a pump or with ropes and buckets much labour could have been saved, but neither was provided.

Diets at first were consistently bad, and were composed of polished rice, often inadequate in amount, some onions, sweet potato, pumpkin, sometimes dried beans, and a small amount of green vegetables. Dried beef and fish were small and inconstant in quantity. The resultant diet was highly deficient in all vitamins, particularly *A* and *B1*, calcium, and fat. There were also deficiencies, though less in degree, of protein and the other members of the vitamin *B* complex. Only after repeated protests did the T/NFC ratio (thiamin in microgrammes divided by total Calories from carbohydrate) reach the minimum standard of 0.3. After a time rice polishings of good quality were issued, and potatoes and sweet potatoes were occasionally plentiful. Canteen facilities were almost nil, and traders visiting the camp had little to sell and that expensive, sometimes prohibitive. No centralised entertainment was possible, but diversions of various sorts were arranged in the wards.

Some more references may here be made to the medical work carried out in the hospitals in the Nieke area and continued at Tanbaya. Major Hunt made a special study of beriberi in "F" Force, which has been drawn upon largely for the account given in Volume I, especially that part dealing with cardiac beriberi. Records show that in the camps from Konkoita to Kami Sonkurai the T/NFC ratio was never above 0.24, usually less than 0.2, and even as low as 0.14. At Tanbaya it only rose above 0.3 in October to 0.43, and reached 0.6 in the last months of the year, when after repeated protests the Japanese supplied rice polishings. With such gross deficiency of thiamin beriberi was inescapable. By comparison the figures for Changi were considerably higher, for though the T/NFC ratio was often low it seldom fell below 0.2, and after 1942 was usually adequate until the bad diets of 1944 showed gross deficiency again. Tanbaya figures show that in September and October 1943 the percentage of the camp population with beriberi ranged from 31 to 39 per cent. Between August and December 1943, 413 deaths occurred attributable solely to beriberi, and 477 deaths due in part at least to the same cause.

Oedema was often extensive, ascites was not uncommon. Neuritic signs were not common, but weakness in the limbs and wasting were not infrequent. Sensory changes were observed, and laryngeal adductor paresis also. Cardio-vascular changes were common; irregularities were frequent; fibrillation was an ominous sign. Signs of cardiac enlargement chiefly on the left side were observed in a large number of patients at Kanburi. Fortunately subsequent investigation at Changi on the return of these men showed that most of them had made a good recovery after treatment. Sudden death occurred sometimes and was observed more frequently among the men of "F" Force at Changi than among others. Diagnoses as stated in medical records were subject to some modification, for the

Japanese forbade some diagnoses; but beriberi, being a condition recognised by them, was used as a diagnostic label when justifiable, though perhaps with occasional freedom. However, the evidence for the frequency and severity of beriberi in Burma and Thailand is convincing.

Tropical ulcers were very severe in these camps. The spreading sepsis caused by these lesions, especially in conjunction with oedema caused dangerous destructive inflammation of deep tissues which cost a large number of men a limb and very many their lives.

Wardmastering. A feature of the medical work of these camps which merits special notice is the system of wardmastering, so successful, and so beneficial to the patients in hospital.

In Sonkurai in May 1943 when affairs were desperate and later in Tanbaya, in Kanburi, and in other hospitals there was need for an organisation to deal with the care of sick men by an insufficient number of orderlies. This was met by wardmastering, on which Captain G. W. Gwynne, of the 2/4th M.G. Battalion has made an illuminating report. Orderlies with variable degrees of experience were working with volunteers, and Hunt obtained the services of combatant officers to manage wards. The wardmaster was in a position of authority, by virtue of which he organised the various services of the wards, supervised the details, and by keeping the domestic affairs and nursing procedures running smoothly did much to raise and maintain the moral and physical condition of the patients. Firewood, fires, hot water and cold boiled water had to be provided, instruments and mess gear had to be sterilised, details of hygiene faithfully carried out and a regular routine maintained. Records also had to be kept, and where a canteen was available this was supervised. Though the wardmaster had no medical training he was in authority over N.C.Os. and O.Rs. and the improvement in the discipline of staff and patients did much to inculcate the principle that there are other duties than to self. Without discipline the weaker and less worthy degenerated: thefts from the dead for example were at one time common, but at Tanbaya the wardmaster had complete power to deal with offences on the spot. The primary objective of this system concerned the spirit more than the body and it was attained. Gwynne, in eulogising the work of the medical staff of the hospitals at Shimo Sonkurai, Kanburi and Tanbaya in particular states finally that "only first class organisation and daily attention to detail saved Tanbaya from becoming a place of death and misery".

In October 1943 Hunt in reporting on Tanbaya pointed out that in five months 30 per cent of the men in "F" Force had already died from disease, that is 2,000 men. The most lethal diseases were cholera, dysentery, chiefly the amoebic type for which specific drugs simply could not be obtained from the Japanese, beriberi, malaria and tropical ulcers. The medical stores in Tanbaya consisted chiefly of the remnants of the original supplies of the force. About 1,150 patients were then in hospital, and

their health was not improving. Nearly half the R.A.M.C. and A.A.M.C. orderlies were then themselves ill in hospital.

Kami Sonkurai. Meanwhile we must return to the remainder of "F" Force left after the most desperately ill men were removed to Tanbaya. This part of the force was gathered from the working camps and marched to Kami Sonkurai, where under Lieut-Colonel Kappe's command they worked till November. Major Stevens made a special report on this period. The camp was poorly drained and in the monsoon was a quagmire, with leaky decrepit huts, and poor hygiene improved only by constant effort. In the final stages of the railway work the men were often out for fourteen hours a day or, in September, even longer, working in the continuous rain which was the *leit-motif* of that period. Three days' rest, promised when the work was finished dwindled to one, on 19th September, and even after trains started running labour was still required for heavy quarrying and maintenance work.

During the period 3rd August-31st October 1,965 Australians and 1,460 British were admitted to hospital, and 1,236 and 896 discharged; deaths numbered 130 and 195. By November the relatively fit men formed a very small percentage of the force, and Stevens forecast "almost total annihilation of the force" unless conditions were greatly improved. The diseases encountered were the same as in other areas, with the addition of an epidemic of respiratory disease, in which some cases of pneumonia were seen. The heavy mortality in cholera, reaching 80 per cent was due to the enfeebled state of the men, in whom it was really a terminal event.

In November 400 men were moved south with Kappe, the sick, including 450 on stretchers remaining at Kami Sonkurai. At first the Japanese insisted that all should be carried six miles to Nieke, and only after a great deal of trouble did they consent to stop trains at Kami Sonkurai where the camp was only fifty yards from the line. Even then trains were often not halted long enough to load the sick, and the bodies of men dying during the journey were not allowed to be buried till they reached Kanburi, a journey of five days.

The centre of gravity of medical work now shifted south. The hospital at Tanbaya was to be moved south to Kanburi, and so too the camp hospitals along the line were to be transferred south to the bases there. Before describing these moves and the work done in the southern group of hospitals we must follow the fortunes of other forces sent from Changi.

Pond's Party. Pond's party has already been mentioned. A distinct train detachment, it remained separate in its movements on the railway. After the same fatiguing train journey of 1,000 miles in 100 hours the party marched from Bampong to Konkoita, 170 miles. Medical supplies were carried, first in the panniers on bamboo poles, later sub-divided among the men's packs. Every third or fourth night was spent at staging posts, which were all filthy, and footsore men were left to cook for succeeding train loads. At Konkoita dead coolies were lying on the fouled ground, it was soon evident that some had died from cholera. On 16th

May the party went on to its forward base at Lower Taimonta, where half constructed huts raised a serious problem not merely of accommodation, but of isolation of cholera, dysentery and diphtheria.

The rice issue was at times down to $7\frac{1}{2}$ ounces a day per man, and only at intervals was the meat of a thin or dying yak added. Only a few cases of cholera occurred, but the wet and hungry men, isolated from their fellows were in poor shape. The party moved into Nieke where the prospects of food seemed better, and the sick were forced to work, unless the Japanese medical officer could discover a palpable spleen. Work at least meant a slightly increased food ration. Leaving fifty sick behind, the party now moved to Takanun in July, and encamped in a very restricted area. Tools were issued for the preparation of the site, but four hours after the tiring march of nearly forty miles they were withdrawn. Five hundred and eighty men, 30 per tent, crowded into an area 75 by 30 yards, and those well enough worked from daylight to dark.

In a week cholera broke out, there were sixty-two cases in all. Mills used most of his orderlies in an isolation block, which was a quagmire with a marquee and two tents. The Japanese sent technicians to find carriers; as one culture was made of five swabbings, which had to be repeated singly if a culture grew, the process was slow. The main camp hospital was supervised by Chaplain Vellacott, and contained a section for suspected carriers, whose disposal was most difficult in the restricted space. The text book instructions given by the Japanese were quite impracticable to carry out. Only crude improvisations were available for the intravenous treatment of cholera with saline, but these were often gratifyingly effective. A 300 c.cm. ampoule was connected with stethoscope tubing to a thermometer case, and thence to a bamboo cannula. These cannulae, made on the spot, were tied in and worked better than the small steel needles. Four pints could be given in twenty minutes, and orderlies after training by the R.M.O. could cut down on a vein and insert the cannula. After the first week at Takanun saline was made at a Japanese laboratory by two R.A.F. medical officers. Forty-four men died out of 102 in both series of cholera. In the circumstances the results were remarkable.

At the end of July 470 sick were sent from Takanun to Wanye by barge, and conditions improved. In August all pretence was abandoned of allowing medical officers to select the sick unable to work; at the end of the month leaving sixty sick behind for transfer to Kanburi the party returned on foot to Taimonta, where 294 men spent two weeks in "double decker" huts with 1,700 coolies, but by the end of September the party had moved to a clean area with good accommodation, though sick men still had to work. On 15th October they met the rail laying gang and saw the first train. A party of 100 was sent to Nieke to bring back tools, and was overtaken by an empty train while the men were carrying 300-pound anvils, a load for four. The whole party, or its remnant of 291 men moved on to Nieke, carrying its sick; these numbered 150, half of them in hospital. Some sick were moved south by train, but

arrangements were chaotic. The party eventually went by train to Kanburi. Up to 10th December 1943, 153 men had died; the underlying causes were malnutrition, chronic dysentery and malaria, aggravated by exposure and overwork. All efforts were made to secure reliable hygienic measures in the camps. Deep open latrines were found most satisfactory if the excreta were covered. In some camps bathing facilities were good, until forbidden, owing to cholera. All drinking water was boiled and mess gear sterilised. The Japanese provided quinine, and some plasmoquine, and a pint of lysol during the cholera outbreak: other drugs were very scanty.

The medical conditions encountered were counterparts of those already described in other forces. Thanks to good leadership, tireless medical care and its own undimmed spirit this party emerged, albeit with heavy losses, from an ordeal which was characteristic of that endured by many others who shared the trials of the working camps. After the completion of the railway Pond's force moved southward, and shared the experiences of the other components in "F" Force in the base hospital camps and the subsequent movements.

(b) CENTRAL THAILAND GROUP

"D" Force

"D" Force consisted of 5,000 troops, 2,780 British and 2,220 A.I.F., who left Singapore on 14th-18th March 1943. Lieut-Colonel C. A. McEachern, R.A.A. was in charge, and Major A. R. Hazelton was S.M.O. Seven A.I.F. medical officers accompanied the force, including Captains R. G. V. Parker, R. G. Wright, P. T. Millard, D. Hinder, I. L. Duncan and J. T. Finimore (Dental). There were thirty other ranks A.A.M.C.

The train journey from Singapore to Bampong took five days and four nights, thirty men travelling in each steel truck. The crowding tempted men to open doors and swing their legs outside: in other parties several accidents occurred in this way through men striking their legs against bridges owing to the narrow clearance on the railway. The whole force was supposed to be inoculated against cholera, plague and dysentery. Hazelton's party had not been immunised against dysentery, but the Japanese produced vaccine and insisted that inoculation should be carried out on the train. This was done with rudimentary asepsis, but without harm. From Bampong the force travelled by sections in flat trucks, but instead of being taken to a British hospital as promised they were left in a paddock. The only water was in two wells which were out of bounds: these soon went dry, and for two days, until the rest of the train parties assembled there was a severe water shortage. They were then driven to Tarsau in lorries. Duncan's party drove straight through and penetrated as far as the Three Pagodas Pass; all trace of them was lost by the others for about a year, when they returned with only about half the men. The peculiar system of Japanese administration made this easily possible, as the railway was split into areas, within which were different

groups each autonomous. Incidentally this made movement difficult between groups, even to medical officers who wished to see how the men were faring.

Hazelton's party and other medical officers went to Tarsau, and their parties were scattered to various camps, in the central group from Konyu to Tarsau. Hazelton came under the command of Lieut-Colonel E. E. Dunlop in this area, and here the "D" Force parties came into contact with Majors Corlette and Moon, who were doing excellent work in the camp hospitals.

Like most of the forces on the Burma-Thailand railway, except "F" Force, "D" Force soon lost its identity: indeed it was absorbed into various autonomous local groups as soon as it arrived at Tarsau. Here Lieut-Colonel Knight was in charge and Lieut-Colonel Harvey, R.A.M.C. was S.M.O. Conditions were bad in these camps. Malaria was very common, for the Konyu camps were in hyperendemic areas and were so badly sited near swamps, that the camps were virtually morasses. Hazelton had brought eight panniers of medical supplies from Changi, but some of the contents were not of great value in the camps: these medical supplies were handed over by Hazelton to Harvey. Some anti-malarials were obtained from Tarsau for use in the Konyu camps, where the casualty rates were high. The British medical officers in this area also had very meagre supplies. The entire medical stocks here for 900 men were contained in a soapbox and there was not even a scalpel. The Australians found, however, that even simple nursing procedures, and the organisation of items of care such as the washing of sick and apathetic patients did much to raise their morale. Konyu No. 1 became a hospital camp; at its peak it held about 1,000 men, with the least sick maintaining the camp. This entailed the carrying of 56-pound bags of rice from river barges; as the river was three miles away and a steep slippery hill of from 500 to 1,000 feet intervened, the exertion entailed was very considerable.

At one time the death rate was so high that there were eight deaths per day. Each morning a "death count" was made, and the men were of necessity buried in common graves. There was an outbreak of cholera during the monsoon. A number of men in one party fell ill with cholera within a few days of being inoculated: it was thought possible that this might have been due to their poor powers of resistance in addition to a negative phase of immunity. Intravenous therapy was not used in this outbreak, but the mortality rate did not differ significantly from that in areas where saline infusions were used. It was noted that the commonest immediate cause was early dehydration, whereas death in the groups treated with infusion was more often due to renal failure, possibly accentuated by disturbance of the balance of electrolytes.

Hazelton went from Tarsau to Konyu in a small boat to inspect these areas, but had great difficulty in gaining permission to inspect outlying camps. Later he walked back along the river through the indescribable mud. Some camps fared better than others, depending to some extent on the amount of successful bargaining which could be carried on with

the Japanese. One combatant officer, Captain Newton, who realised clearly the medical aspects of expectation of life in these camps, was particularly successful in this regard. The railway was pushed quickly through Konyu and the men in the camps were later returned to Tarsau by river barges.

One interesting feature of the medical work may be mentioned. Malarial diagnosis was possible, as a microscope was obtained and some stains, and M.T. was found to be common. Some of the infections did not respond well to quinine, and atebirin was used, though very little was available. In order to ensure prompt action and full absorption intravenous injections of atebirin were used. On the suggestion of Captain Markowitz a solution of atebirin in $12\frac{1}{2}$ per cent alcohol in water was used with success; no untoward reactions were observed, and the euphoria caused by the alcohol was appreciated by the patients. Some sudden deaths occurred after the oral administration of Japanese quinine. A suggestion was made that these were due to impurities such as quinidine.

Gradually the components of "D" Force came back to Kanburi in the southern concentration area; the sick were sent to Nakom Paton, and the fitter men to Tamarkan. Before the end of the war the officers were taken away and put in officers' camps. During the early months of 1945, after withdrawal of combatant officers who had charge of the camps, medical officers were placed in charge, and as the problems were largely medical in nature administration ran on smoothly. "D" Force never reassembled as an entity, but its total mortality was reckoned at 18 per cent, rather less than the more usual figure of 25 per cent which was the mortality experienced by most of the other forces.

"Dunlop" Force

The day on which the first ship of the convoy bearing A.I.F. troops from the Middle East arrived in the south of Sumatra was the day of the capitulation of the forces in Singapore, and hurriedly the *Orcades* sailed for Java, and disembarked troops at Tanjong Priok. With these troops was the 2/2nd Australian C.C.S. Lieut-Colonel Eadie, the commander, was appointed S.M.O. of the Australian forces in Java under Brigadier Blackburn ("Black" Force), and Lieut-Colonel E. E. Dunlop then took over command of the C.C.S. The staff of this unit, including also Majors A. A. Moon, E. L. Corlette and J. E. Clarke (Dental) formed the nucleus of the Allied General Hospital at Bandoeng, the command of which was taken over by Lieut-Colonel Dunlop on 24th February, with a staff reinforced by R.A.M.C. and R.A.F. medical personnel. Six members of the A.A.N.S. had arrived at Batavia on 15th February from Singapore, and helped to evacuate wounded on H.M.I.S. *Kapala*. They did not embark on this ship, but went to a hospital at a convent, and for several days assisted the C.C.S. at Bandoeng. Eight nurses of the 2/2nd C.C.S. who had disembarked at Tanjong Priok on 19th February moved with the unit to Bandoeng. All the nurses were sent back to Batavia on 21st February and sailed for Australia on the *Orcades*.

The Allied General Hospital was now busy with patients arriving from Sumatra, many of whom had wounds inflicted two or three days previously requiring treatment. The hospital rose to a total of 1,000 beds, and work continued there even after the unconditional surrender of Java on the 8th March, and the staff were still doing valuable work when the Japanese suddenly disbanded the unit on 18th April at a few hours' notice. From the 27th February to 18th April 1,351 casualties were treated including 170 men with wounds and fractures. Most of these came from the action of "Black" Force against the enemy on 4th and 5th March on the Llewellyn River. The Japanese forcibly marched the staff and most of the patients to a grossly overcrowded native gaol with negligible facilities for treatment, where they were humiliated, underfed and subjected to harshness and violence. All red cross markings, rank badges, and protective cards were abolished. Lieut-Colonel Dunlop was recognised as the senior officer and as such was placed in administrative charge of camps of varied nationalities, up to 2,000 in strength. He was then ordered to assume command of a detachment of troops which was known locally as "Dunlop" Force which travelled by ship to Singapore and ultimately by rail and road to Konyu railway construction area on the Menam-Kwa Noi River in Thailand. With this party travelled fifty-eight of the seventy-eight captured members of the 2/2nd C.C.S. who left Makasura transit camp near Batavia on 4th January 1943. Orders had been given that no medical stores should be taken, but as many supplies as possible were distributed amongst a number of individuals. Dunlop himself took a set of surgical instruments which he always carried personally.

After a bad trip in an overcrowded ship the party reached Singapore, and shortly resumed the journey by rail under conditions of similar crowded discomfort for four days and nights. The party after further travel by truck and on foot reached a site at Konyu in the untouched jungle of the Kwa Noi River over ninety miles from Bampong. Most of the medical orderlies were ordered to work on railway construction in spite of the greater need for their technical services. Dunlop in addition to doing medical work administered the working battalions. He was for some time commanding Hintok jungle camp, while another detachment of his Java party was commanded by Major F. A. Woods. "Dunlop" Force worked under shocking conditions, with totally inadequate rations, labouring at night as well as by day, with twenty men crowded into a small R.D. tent to sleep. It is not surprising that 149 deaths eventually occurred in this force, for the greater part of the men needed treatment on sick parades or in hospital. There were already ominous signs of starvation and exhaustion among the 3,000 British troops who had been working in this area. Hygiene was very poor among the working battalions, and was difficult to improve, especially as the Japanese themselves and the native labourers did nothing to prevent fouling of the area; nothing was done by them to supply tools and materials. The men entered almost uninhabited jungle areas with only primitive equipment, and even in cold weather they frequently had to sleep in the open without protection.

Bedding and clothing were almost non-existent, and boots soon disintegrated. In June 1943 out of a total of 1,085 men 302 had no boots, 288 had useless boots, and only 341 had satisfactory footgear of any kind. Anti-malarial work was virtually impossible, and in consequence malaria attacked most of the men, who also suffered from malnutrition, and tropical ulcers. There was in addition an outbreak of cholera in these camps of this central area.

The hardships and dangers of these camps would have been even greater had it not been for the self-help of the prisoners of war. In addition to heavy tasks of construction, often carried out by the administrative staff remarkable works were carried out. For example, at Hintok mountain camp Woods, while second-in-command of one of Dunlop's working battalions was instrumental in the building of a catchment dam for spring water which was piped in bamboo for several hundred yards. This provided showers, ablution and water-bottle filling points, kitchen supplies and water for distillery condensers.

Towards the close of 1942 the need for some further service for the sick in the southern areas gave rise to the establishment of hospitals towards the Bampton end of the railway; these worked under very unfavourable conditions. One of the earliest of these was a camp hospital at a railway workshop base at Non Pladuk, established by Major Smythe R.A.M.C. in October 1942, and accommodating 500 to 600 patients. In November 1942 Major Black R.A.M.C. opened a hospital at Chungkai, where medical work continued on a large scale till near the end of the period of captivity. Though this was in the main administered by the R.A.M.C. Dunlop acted as S.M.O. for a time. At Tarsau, sixty-eight miles from Bampton was another hospital base, established by Lieut-Colonel Harvey, R.A.M.C. and also administered by Dunlop for a time. At Kanburi Lieut-Colonel Malcolm, R.A.M.C. began a hospital in January 1943, which took the sick from the jungle camps. It was largely built by the men themselves, and accommodated 1,000 patients, and in spite of difficulties did excellent work, including the performance of appendicectomy for amoebic dysentery, which as a method of intestinal drainage was pioneered by Pemberton and Dunlop in jungle camp hospitals. At Kinsayok on a rather swampy site near the river Major Bennett, R.A.M.C., established a hospital in February 1943, taking 1,000 to 2,000 patients, and here the Japanese in 1943 assented to a new and better building programme. Dunlop for a time acted as S.M.O. Two other hospitals were begun in 1943, at Takanun in the central area with Major Pemberton R.A.M.C. as S.M.O., and at Tamarkan in the south, administered by Major Moon A.A.M.C. Takanun later suffered severely from a cholera epidemic. The size of these hospitals, arising from the need of the central and upper Thailand camps, gives some measure of the physical state of the men in working camps such as Konyu and Hintok at this period when severe pressure was put upon them by the railway engineers, regardless of their obvious unfitness for labour.

In the central camp groups the 2/2nd C.C.S. detachment kept some degree of cohesion as a unit until the railway was completed, when it was broken up into a number of small groups. The members suffered badly from illness, but all who were able carried on with their work. The value of these men trained in a school of hard experience in Java and Thailand was seen to particular advantage when they were dispersed and worked in small parties.

Mortality was high in these hospitals during 1943, due principally to dysentery, deficiency diseases, malaria and tropical ulcers in this order. The medical officers were fully aware of the important part played by poor nutrition in the high death rate. Malaria was chiefly of the benign tertian type, and cerebral malaria and blackwater fever were rare, but later in Tamarkan malignant tertian became more common. Most of the association of the 2/2nd C.C.S., with the bases was during a later period, after the railway had been completed. During the early and middle parts of 1943 the bad conditions in the hospitals reflected those of the working camps like Konyu and Hintok. The larger hospitals grew up in response to the need of camps in their neighbourhood, and were in this way different from those organised during 1944 when the Japanese policy underwent a change. In these early working camps in Thailand facilities were negligible, and evacuation of patients to larger centres was capricious. It was only after continued pressure that the Japanese would permit very sick men to be taken to Tarsau by barge, though the facilities for such movement were to hand. The haphazard methods exposed sick to delays in transit, which sometimes lasted for days, during which time they had no attention or food. It was not uncommon for men to die during the journey. The treatment of the sick was harsh in the extreme; pay was stopped, rations were reduced, and sick men were employed on tasks which accentuated their hardships. For example men with ulcerated feet were sent to work hauling logs or clearing rock in rock cuttings after blasting, with the excuse that this was light work. Dunlop saw some 1,000 men suffering from severe tropical ulcers, in 20 per cent of which bone was exposed. He found that curettage with application of phenol or lysol followed by a dusting of iodoform gave good results and if used in time amputations were unnecessary. The only surgical supplies obtainable were those carried by the medical personnel from camp to camp, plus what they could improvise. Even important specific drugs were not supplied. Some small stores brought from the Middle East lasted during the early months of 1943, such as sulphaguanidine and sulphapyridine, but in spite of the benefits gained, dysentery still killed many.

Canteens were almost useless, as goods, even if obtainable, could not be transported, owing to the disinterest of the Japanese engineers. Eggs were the most valuable supplement that could be bought, and, as was often said in this connection, much was owed to the Thailand ducks.

In Hintok cholera appeared among the coolie labourers, and in spite of precautions broke out among the prisoners of war in June 1943. Ingenious and successful methods were used in treatment. Improvised stills pro-

duced 120 pints of saline per day, and individuals received up to 20 pints in a day. The Japanese would not allow men who collapsed at work to be carried in except by the hospital staff; it was remarkable that the patients survived periods of exposure to blinding rain and a rough journey in the dark. Of 150 patients 66 died in about two months, often from the combined effects of malnutrition and infections of various kinds, particularly the debility following cholera.

An operation for perforated duodenal ulcer was successfully performed by Dunlop by the light of candles and a bonfire; and similar emergency operations were carried out in various camps. The mortality during these grim months of 1943 in this group of railway camps varied from 12 per cent in some working battalions to nearly 50 per cent in others. Of a total of 1,727 in four working battalions in August 1943 1,290 were in hospital.

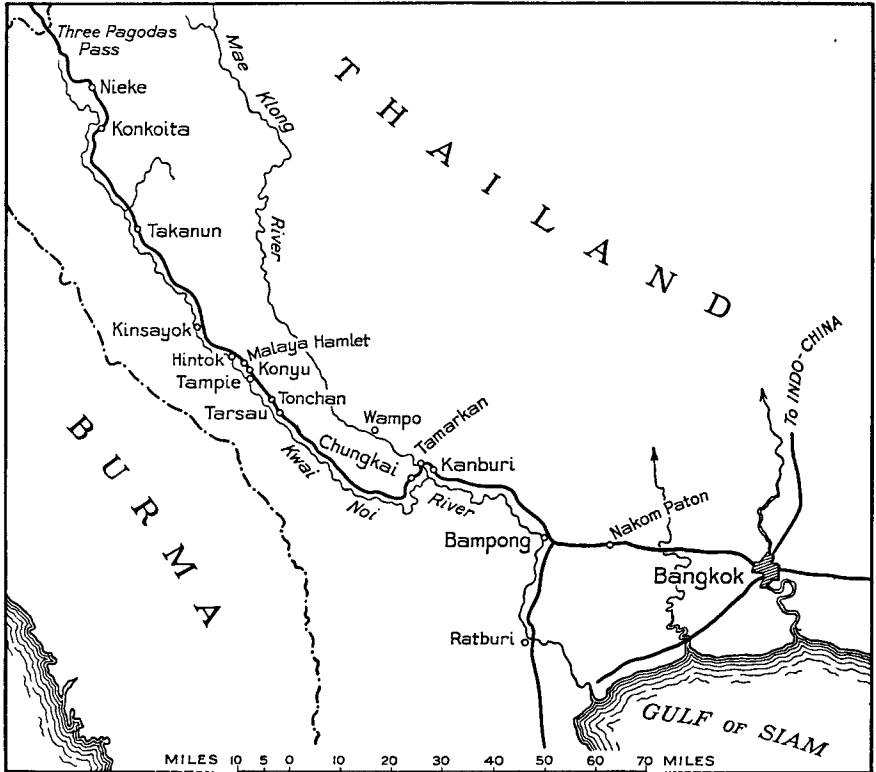
The Japanese camp commanders occasionally required answers to *questionnaires* sent out by them. In one of these at Konyu Dunlop pointed out clearly that the camp conditions were unsatisfactory, both with regard to accommodation and hygiene, and rations were insufficient to maintain health, especially when hard work was demanded. The commander not being satisfied with this, asked for a further exposition of the "attitude" of mind as to camp". To this Dunlop replied that his attitude of mind was one of grave disquiet and fear for the lives and health of troops placed in his care. He expressed worry that the men could not possibly remain healthy while only a fraction of the scale of vegetables and meat was supplied, quoting the amount of entitlement for the period 25th January to 2nd March 1943, 3,212 kilogrammes of meat and 18,000 kilogrammes of vegetables, and contrasting these amounts with those actually received, 300 kilogrammes and 4,500 kilogrammes. He further stated that of 873 men only 350 were fit for heavy work. To this may be added the following list of medical supplies received on 16th April 1943 at Hintok camp for one month's supply for 1,000 men:

Kruschen salts . . .	1 bottle	Cloth for bandages	1 square yard
Pot. Permang. . . .	1 oz.	A few tablets each of	
Salicylic acid . . .	$\frac{1}{2}$ oz.	aspirin	
Mercurochrome 2½% .	3 ozs.	sod. bicarb.	
Cotton wool	4 ozs.	acriflavine	
Methylated spirit . .	1 oz.	plasmoquine	
		atebrin	

The incidents and conditions described in this section are characteristic of those experienced in this group of camps, and illustrate not only the medical work attempted and carried out there, but also one of the rare instances in which a medical unit was able for a time to work without entirely losing its identity. The Australian history of the various groups of Thailand working and hospital camps is, however, so bound up with the history of "F" and "H" Forces that further account of the work done there must be incorporated with the story of these parties.

"H" Force

On 5th May 1943 the first of six parties comprising "H" Force left Singapore by train, the other parties following at intervals up to 22nd May. This composite force of some 3,000 men consisted mainly of British troops; 600 were Australians, over half of whom had returned from Java, and there were also some American and Dutch troops. Lieut-Colonel H. R. Humphries commanded the whole force, and Lieut-Colonel R. F. Oakes the A.I.F. section. There were three A.I.F. medical officers, and eighteen other ranks and Major E. A. Marsden acted as S.M.O. During



"H" Force—Burma-Thailand Railway.

the journey from Changi to the central working camps on the Thailand railway the component parties of "H" Force experienced similar conditions to those suffered by other forces. Rations were carried from Changi for the journey and in addition, a double meal was issued daily mostly rice and spinach soup; it was possible to supplement this by purchases. The four days and nights of travel were most wearying, with no water for washing and insufficient for drinking, and hygiene was very bad. The transit camp at Bampong was filthy, with no provision for accommodation

of the sick and shocking sanitary arrangements. Many men had diarrhoea during the train trip, and after arrival others presented signs of clinical dysentery. Medical officers treated the sick so far as their limited facilities permitted, but even though the Japanese medical officer agreed that certain patients were unfit to proceed on the march the guards refused to allow more than a small number to remain.

The party marched on by night, carrying their gear and such of their belongings as they had not sold to natives. Small numbers of sick were allowed to remain at the various staging camps along the route, but most, including those with septic lesions of the feet, were forced to go on. The incidence of these ulcers increased, and many men suffered from fever of undetermined nature. Heat exhaustion also affected numbers of men, and one of them died. The conditions of the march were poor; the rain-spoiled roads were slippery with mud, and many of the men, in poor condition at the start, collapsed on the way. The stages were not long in themselves, about fifteen miles, and the total distance covered ranged from sixty to ninety miles, as no party of "H" Force went farther north than Hintok at this time. The state of the roads hindered the use of motor transport, and this adversely affected the distribution of rations and other supplies.

At Kanburi the Japanese carried out tests for cholera and the men were inoculated against cholera and dysentery. On 21st May the first site for a camp was reached at Malaya Hamlet, at the northern end of the central group of working camps on the railway. The food in some of the staging camps was reasonably good, particularly when extras could be bought at canteens, and the guards were on the whole patient and sympathetic.

One of the "H" Force parties, known as H6 officers' party left Changi on 17th May 1943, travelled by train to Wanye, forty miles from Bampton, and from this point marched in two stages to Tonchan South and began there the preparation of a permanent camp. It then appeared that this party was to be used on railway construction work: protests were made but were quite ineffective.

On arrival at its camp site each party of the force was given twenty-four hours for the usual fatigues of making a camp, a work very burdensome to the weary men. Rain fell without ceasing, and continued so for the first month, increasing the discomfort greatly, particularly as the lack of time and facilities made any drainage work impracticable. The uncleared jungle country was very hilly, covered with clumps of bamboo, but the camp sites were usually in low-lying places, which made the conditions even more miserable. Accommodation was restricted to tents, always wet and muddy, and always overcrowded. Clothing was soon ruined, and boots soon fell to pieces, and blankets were always insufficient.

The food varied in different areas, but was almost consistently bad. The ration supplied was rice, 12 ounces per man per day, dehydrated potato, and other very unpalatable vegetables and dried fish. Fresh food was not supplied and the diet was deficient in protein and fat, but after a long period had elapsed, meat was provided, though by that time many

men had succumbed to illness enhanced by malnutrition. Special food for sick was extremely difficult to obtain; though occasional purchases could be made from barges passing through it was often impossible for the men to be free to do any buying. All rations had to be carried over steep hills from the river, and this alone was a burden for men already tired from working. The usual reduction of the diet of the sick intensified the difficulties: when supplements such as eggs, towgay, peanuts, gula malacca and tinned fish could be bought, and when even a few ounces of yak meat could be added the results were encouraging. Cooking facilities were most inadequate, containers and utensils were insufficient, and the difficulties of using mud ovens under improvised shelters were great.

Hygiene was of low standard, and it was most difficult to maintain personal and communal sanitation of even a primitive kind, owing to the prevalence of dysentery, the swarms of flies and the lack of tools and materials for necessary construction. Only the resolve of the camp commanders and the work of those sick who were not forced out to heavy labour could maintain even the standard achieved. The men worked from early morning till night, and if their place of work was distant or if the demands of the engineers were heavy they sometimes did not return till midnight.

The Japanese command at Changi which administered this group of camps seemed to try to overcome difficulties, but control was remote and ineffective. Lieut-Colonel Oakes found that most of the camp guards were reasonable, and the officers at the local headquarters were courteous. Nevertheless the forces working in this group of camps were subjected to the poorest of living conditions, inadequate diet and were expected to perform heavy labour by engineers who were inexorably concerned with a flow of labourers, regardless of consequences. The components of "H" Force, like others under similar administration, lost their cohesion, though their officers managed to obtain some administrative changes, which ensured better relations between the guards and the members of the force.

The main body of the force enlarged and improved the camp at Malaya Hamlet, though, not unnaturally, the men, suffering from depression and fatigue, were resistant to further demands on their scanty energy, and not always easy to handle.

Early in June some hundreds of stragglers had increased the number in the camp, and one-third of these were sick; fortunately the guard commander was willing to reduce the size of the working parties. On 16th June Major Fagan reported a case of cholera; strict precautions were taken at once, and all men were inoculated. Cholera broke out amongst the coolies in the Hintok area, but efforts to limit it failed, and it spread to the prisoners. It was strange that the Japanese, though afraid of the ravages that cholera could cause, never applied the ordinary measures of proper isolation and control of movement from infected areas.

At the end of June over 200 more men arrived in the main camp where men ill with various complaints were increasing daily. At Tonchan South also nearly half the A.I.F. members in the officers' party were ill. At

Malaya Hamlet deaths were increasing from cholera; as many as ten bodies were cremated at a time, or buried in community graves when the Japanese later forbade cremation. By 3rd July 400 patients were in hospital and 200 had cholera, and a week later only 120 men were available for work; 80 of these were day workers, the remainder worked at night.

The death rate remained high till the end of July, but dietary supplements, particularly meat and eggs were more liberal, and the weather was improving. At Malaya Hamlet camp 217 men died, 111 being A.I.F. and 106 British troops.

Parties including unfit as well as those able to travel were sent north to the Hintok jungle camp and the Hintok river camp; some of these came from Tonchan where there had been much serious illness. Issues of boots and clothing were made at this time at Malaya Hamlet and were of special value to the men sent to Hintok.

At Tonchan South the lot of the officers' party was particularly hard, as its members were not fit for the exacting work demanded of them, and malnutrition and exhaustion made them prey to infection. Among those under Major F. Ball's command were 188 British, 68 were Australian and 37 Dutch. Numbers of these officers were older men who had not even been considered as members of up-country parties. From May to September a Netherlands party was at Tonchan spring camp; this party, though badly affected by dysentery, was unusually fortunate in being untouched by cholera. Captain C. A. Kuypers, the medical officer, attributed this to intensive inoculation of the Netherlands force in the N.E.I., and to the valuable asset of good spring water in the camp. Tonchan camp, under command of Lieut-Colonel T. H. Newey, suffered severely from cholera; the commander remarked of this and the sub-camps at Hintok that the nutrition of the men was already seriously impaired by poor diet and their stamina by fatigue before the full force of the epidemic struck them.

In the Tonchan camp the "H5" battalion stationed there had its burden increased by the arrival of the officers' party at Tonchan South, as so many of this group were unfit. Newey, recognising the menace of poor sanitation in a camp of Tamil labourers, offered the help of some of the officers and men of his regiment who could speak Tamil, but the Japanese refused permission. However, a joint cholera hospital was organised for the treatment of all parties in the immediate area with some success.

The Hintok camps suffered severely from cholera, especially at the peak of the monsoon season. The Hintok valley camp was better supplied with food than some, though cooking arrangements were inadequate. Had the Japanese organisation been better planned a more equitable distribution of food could have been assured, using river transport. Though milk and other food extras were later obtainable they were unfortunately unable to correct irreversible changes in many of the sick men. The Hintok camp was in a very bad position at the foot of a limestone cliff and all food had to be carried four miles from the river camp, the last half mile necessitating a climb over limestone rocks and then up a thirty-

rung bamboo ladder over the rock face constructed by Major F. A. Woods. The working parties had to travel this route night and morning; the sick men were bound to bamboo stretchers, and at night were often lowered by rope by the light of a bamboo fire at the foot of the cliff. When cholera was at its height the sick could only be housed in shelters of split bamboo which were not waterproof. This wretched housing was at least better than the first isolation camp there, a few tattered tents in a swamp. Late in July the valley camp was evacuated to the river camp. Many very sick men were forced to make this four mile journey to the river. Seventeen out of 110 walking sick died in forty-eight hours, and 26 other seriously ill men had to be carried in pouring rain. All of them died later.

A small detachment of "H" Force including officers was later sent farther north to Konkaita. The camp site was excellent but feeding was at first bad and working conditions were very bad. The march to Konkaita imposed a severe burden on the men; one died of cholera on the road. At the end of August the Japanese ordered a general move of the force to Kanburi. In September a party was left temporarily at Malaya Hamlet to clear up the camp, and the remainder were sent to Kanburi; Newey also brought a party of about 200 from Konkaita to Kanburi camp in November.

The general medical conditions prevailing in "H" Force resembled those already described in "F" Force, and the same difficulties were encountered in attempting to organise preventive measures in the camps.

The efforts of the non-fit men, who were not forced out to work contributed greatly to the hygiene of the camps, as the men working on the railway usually had no daylight hours in which they could do camp work, had their tired bodies permitted. Even washing of clothing had to be done in muddy streams in the dark. Sick parades, as in other hard-driven bodies of troops on the railway, could only be held before the men left in the morning or at night after they returned. The camp hospitals were of the usual pattern, with sick lying on bamboo slats close to the muddy ground. In emergency the need of supplies was most keenly felt in those camps distant from a supply base at a railhead, such as Tarsau. In emergencies too, such as an outbreak of cholera, the work of the camps was intensified. The Japanese would not consent to an occasional period free from work during which the camps could be cleared up. Even the burial or cremation of the dead increased the burden on those remaining well. It was only when necessity drastically reduced the number of possible workers that the demands of the Japanese were relaxed. Even when the decision was made to send the sick to a hospital near Kanburi the movements involved inflicted hardship on many of the patients. The patients from five to six camps of "H" Force were sent south prematurely in July, when the proposed "H" Force hospital was not ready: for the next month they were accommodated in a hospital camp under the care of Lieut-Colonel Toosey of "D" Force.

Medical supplies to the camps were limited. Some supplies were brought to the "H" Force headquarters camp, after considerable difficulty, but access to the store and transport to the camps were always troublesome. Dressings were always scarce, but supplies of quinine were adequate. Yeast tablets could be easily obtained, so too could other substances of dubious value, such as opium pills and creosote.

The conditions prevailing during the cholera epidemic have been described. Major Marsden pointed out that the coolies, a constant focus of infection, worked on the same jobs as the troops, and were responsible for a widespread contamination of the camp areas, in which the earth, the vegetation and the working tools alike were soiled. The death rate from cholera was estimated at 70 to 80 per cent, and most of the survivors died later from other diseases. Notwithstanding the routine practice of sterilising all mess gear before eating, dysentery was widespread: it was predominantly bacillary. Beriberi affected 60 to 70 per cent of the troops, and was aggravated by infectious disease: no rice polishings were ever supplied in spite of protests. Malaria spared no one, and though dangerous attacks were rare, its effect on debilitated men was further to depress their powers of resistance.

As the elements of "F" Force spread out over the northern working camps towards the Three Pagodas Pass, those of "H" Force were concentrated in the camps in the Konyu area, including Hintok to the north and Tonchan and Tarsau to the south. Some of the medical officers of the 2/2nd C.C.S. were associated with the work of the camp hospitals in this area; Dunlop, Moon and Corlette in particular worked in this central group of camp hospitals until with the completion of the railway the prisoners of war, or their remnants, began to move to the southern group of base hospitals. Moon went to Tamarkan, which was opened in May 1943, close to Kanchanaburi, and there administered the hospital until it was evacuated to Chungkai hospital in December 1943.

Dunlop's working party of some 850 was at Konyu and at Hintok for some time, at Hintok Dunlop and Corlette encountered the most severe outbreak of cholera. Though no bacteriological confirmation could be obtained there none was needed, as the clinical picture was distinctive with the urgent fluid loss, the "rice water" stools, and the cramps, leading to swift dissolution unless treated energetically and promptly. The extemporisations at Hintok included water stills made from stolen petrol piping and bamboo. The mortality, 42 per cent, compared more than favourably with that in other centres, where it was usually over 50 per cent: in Tarsau a small epidemic broke out among sick men on special diets, and over 80 per cent of them died.

Hintok was later reinforced, and Lieut-Colonel McEachern became camp commander, thus allowing Dunlop more freedom for medical duties. These working parties saw a good deal of the "H" Force camps in the neighbouring areas; it was noticeable to all working in these camps that under the remote control of the Japanese administration from the Malayan headquarters the most terrible hardships were suffered.

The A.I.F. working battalions "O", "P", "S", and "T" with total strength of 1,727 on 12th August 1943 had 1,290 in hospitals at Hintok camps, Konyu and Tarsau.

The final episodes in the trials and journeys of "H" Force are its transfer to Kanburi base area, and the withdrawal of the force from Thailand. Late in July 1943, following strong representations from Lieut-Colonel Humphries, the Japanese announced that the force would be sent to a hospital near Kanburi, but as already told, the first moves were made before a hospital was ready, and the sick were looked after in a "D" Force hospital camp. When the hospital at Kanchanaburi was ready sick were admitted there, and found that the diet was at first much better than that supplied in the central railway working camps. There was a good canteen, and a special diet kitchen was established with excellent results.

At the end of August new attap huts were completed at Kanchanaburi village near Kanburi. At first there was bad overcrowding, but the arrival of Major Marsden, S.M.O. of "H" Force with a party of nine medical officers and sixty orderlies from "L" Force greatly improved matters with their much needed help, for there were 800 patients in eight huts, most of them seriously ill. Lieut-Colonel Benson of "L" Force arrived also and took over command of the hospital.

On 9th September Humphries arrived with a further detachment of "H" Force, and these men built a camp for the fit, a few miles away. Sick continued to arrive, and twenty-eight wards were soon filled with sick from "F" and "H" Forces. From "H" Force 2,296 patients were treated. The great increase in patients brought about an unfortunate deterioration in the diet, in spite of constant protests.

On 8th November 1943 Newey travelled to Kanburi with some 200 men of "H" Force: treatment on the journey was inconsiderate, particularly with regard to meals but when the remnant of the force was sent back to Singapore on 8th, 9th and 10th December they were treated well by the Japanese in charge.

After the return of the survivors to Singapore numbers showed a substantial improvement in health, but of the 1,057 patients sent from Kanburi to Singapore half were known to have died at a later date. As Newey pointed out, the short period of plenty came too late to save men already weakened by starvation.

The result of the privations, starvation and overwork suffered by the men of "H" Force is shown in the following table, which was incomplete at the date of compilation:

	Total	Left behind	Dead at 10/12/43	Percentage died
All officers . .	421	6	26	6.27
British O.Rs. . .	1,719	38	627	37.30
Australian O.Rs. .	627	12	165	26.83
Dutch O.Rs. . .	503	6	33	6.64
Total	3,270	62	851	26.53

These figures may be compared with the approximate A.I.F. figures for "F" Force:

Strength of A.I.F.	3,662
Deaths up-country	892
Missing up-country	13
Remained up-country	534
Deaths after return to Singapore	32
Returned to Singapore (December 1943—10th April 1944)	2,223
Percentage died (approx)	25

"K" Force

A combined medical force known as "K" Force left Changi by order of the Japanese on 25th June 1943. Its function was said to be the care of sick prisoners of war in established hospitals, and its members would, so the Japanese stated, be returned to Changi in four months. Major R. Crawford, J.V.F. commanded the party, which consisted of thirty medical officers and two hundred orderlies. Major B. H. Anderson was in charge of the A.I.F. section, in which there were five medical officers and fifty medical orderlies. Information reached Changi that the destination was Thailand, and that cholera, dysentery and malaria were rife among the prisoners of war already there. Therefore in spite of orders that general medical supplies were not to be taken, a supply of essential drugs and surgical equipment was packed, with reserve rations and Red Cross supplies for the sick.

The force reached Kanburi after a slow uncomfortable rail journey of eight days, made rather more tolerable by the Japanese guards who permitted local purchase of food by the troops. Fortunately the officers had split up essential drugs such as sulphapyridine, atabrin and quinine between themselves and carried them on their persons, for the rest of the medical supplies were confiscated. The Japanese officer commanding the sanitary corps of the railway construction group addressed the men, stating that the Allied forces were being used as a labour force, and that there had been much sickness and many deaths. To ensure their competence to prevent this he set them an examination; failure to pass this would mean their employment as coolies. Dental officers were graciously advised to mark their papers as "dentist" and do their best. In spite of the technical nature of some questions, and the protests which had been lodged against confiscation of supplies all members of the party passed with honours! The medical portion of the equipment was also returned.

One section of the party left next day by train for Wanye, to an area near a filthy coolie camp, and half of this section was sent on to Nieke. Another section was retained at Kanburi, under Major Davies, and one at the Kanburi airport.

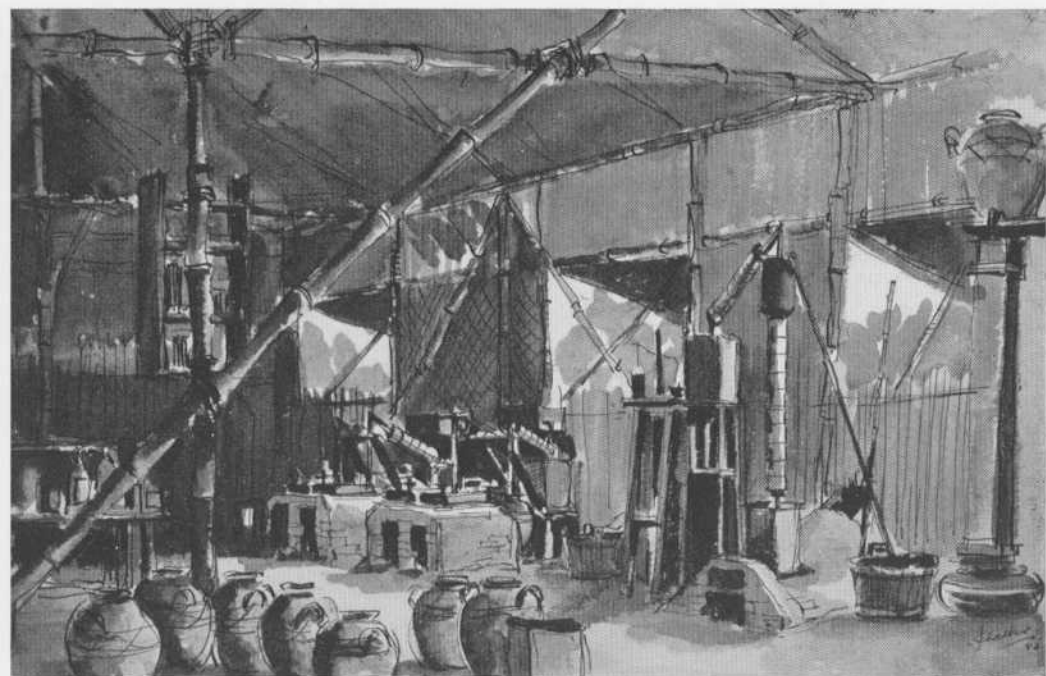
The first period of the experiences of "K" Force was occupied by work in coolie camps in these areas of the railway. After that the general south-

ward movement began, and later reference will be made to the activities of the force at Kanburi, when the base hospital there assumed considerable importance.

The officers of "K" Force soon realised that they, like "F" and "H" Forces were theoretically under the Japanese Singapore command, and that their conditions were worse than those controlled by the Thailand administration, since liaison between these commands was virtually lacking.

From July till November 1943 "K" Force worked in coolie camps to which they were attached in small parties, usually consisting of a medical officer and four other ranks, trying to stem the rising tide of disease with few or no supplies. Not all the officers in "K" Force were permitted to do medical work even for coolies; some were detailed for cookhouse and other camp duties, and acted as bath coolies for the Japanese. The medical personnel always dug graves in the camps; in the camp at Nieke huge graves were needed, five hundred coolies being buried in one section. The coolies themselves were appreciative of the efforts made to alleviate their hard lot, and were generous in helping the medical party to improve the diet of its members, and even made gifts of food. The mutual assistance served to lessen the risks of vitamin deficiencies; the mainstays of dietary supplements were kachang ijaou, peanuts and eggs. The coolies themselves realised after considerable propaganda that food was the best investment of their earnings, even though prices kept rising. Nevertheless, beriberi and other deficiency states appeared and were a cause of death in association with infectious disease. In spite of supplements the rations for some months were very bad indeed, often drawn from the coolie kitchens or if possible cooked by the men themselves. Accommodation was very poor, gross overcrowding and with negligible shelter from monsoonal rains. The poor sanitation of these camps was a terrible menace, as the coolies had no idea of preventing their muddy living areas and tumbledown shelters from contamination with rotting food and excreta, which attracted countless swarms of flies. To these acts of neglect were added needless acts of cruelty: Japanese medical orderlies had been seen administering chloroform intravenously to random patients in coolie hospitals and watching the convulsions preceding death.

Surgical dressings could be obtained only by boiling strips of clothing removed from the dead. Banana plant fibre provided some bandages, and rock salt, permanganate of potash and river water provided the material for treating injuries, tropical ulcers, and cholera. Bamboo provided the usual range of building and furnishing materials and utensils. When the railway was completed the conditions gradually improved, and with the lessened strain on labour more help was obtained from the Japanese to improve the hygiene of the camps. The weather was better with the passing of the monsoon, with which passed too the cholera. Hospital huts could then be built and isolation huts provided for infectious diseases, medical supplies were obtainable, anti-fly measures took effect, and the appalling death rate of fifty to sixty per week in a camp averaging 1,000

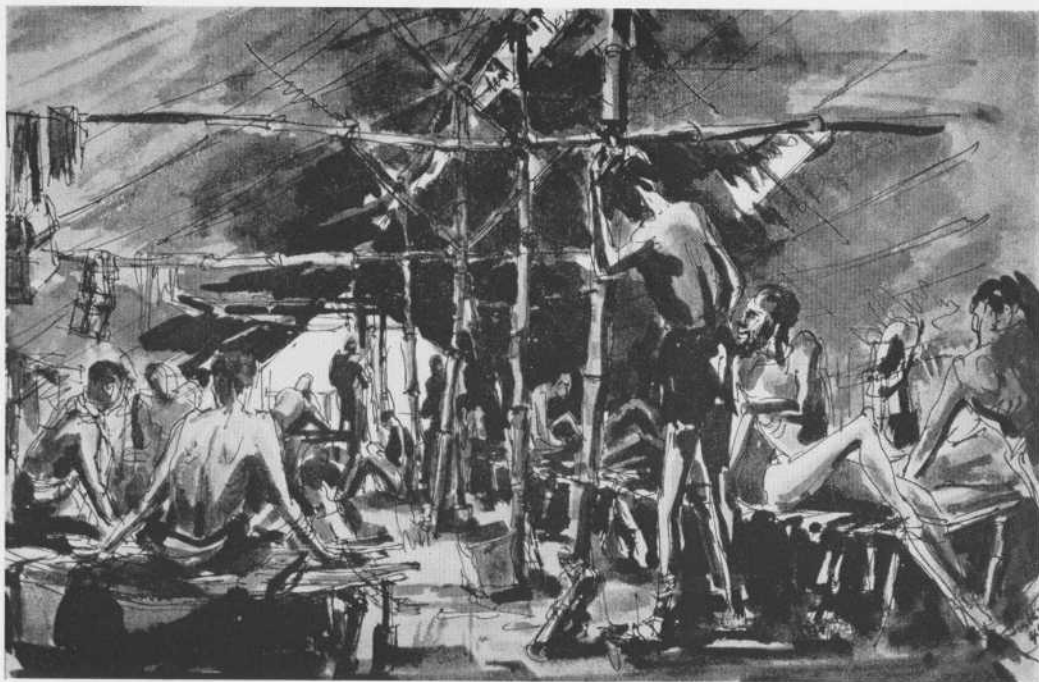


Alcohol Distillery, Nakom Paton.

(Drawn by J. Chalker)

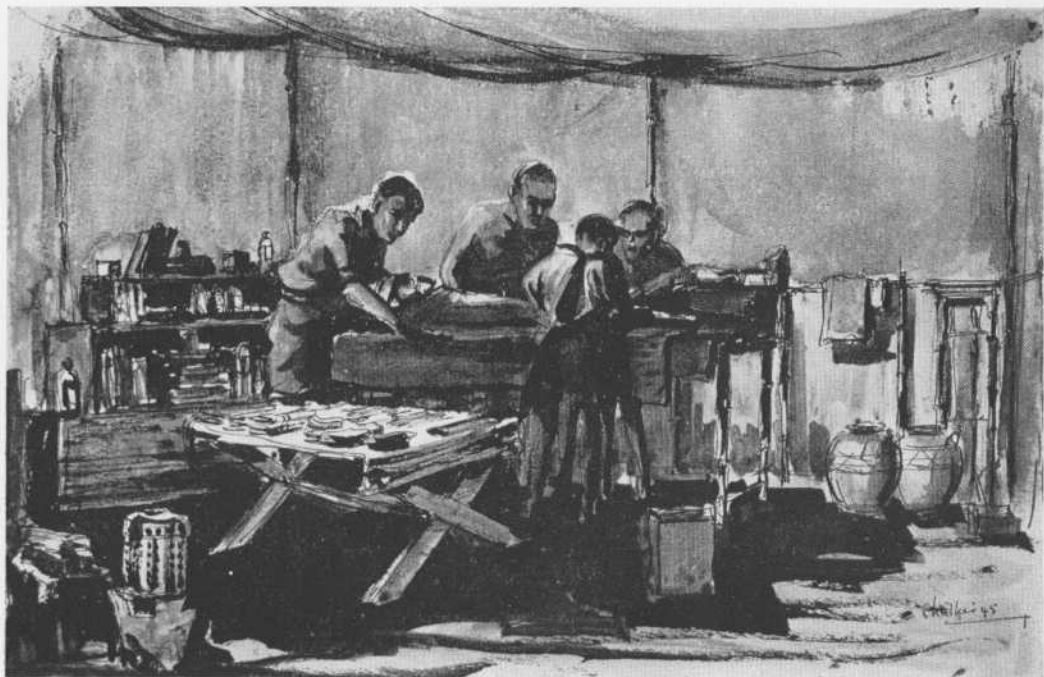


Selarang Barrack Square Incident, September 1942.



Chungkai Base Hospital, Thailand.

(Drawn by J. Chalker)



Chungkai Operating Theatre.

(Drawn by J. Chalker)

in strength fell to two or three per week by the beginning of 1944. The Japanese medical corps became very active at this time in inoculating all members of camps, whether prisoners of war, coolies, or even native Thais living in kampongs along the line. Most of this work was of course done by the members of "K" Force in the camps where they were stationed. Early in 1944 the Japanese trained Malayan dressers for three months, and introduced them into the camps to replace British orderlies. This was not of much advantage, as the new trainees had only rudimentary knowledge, and those orderlies they replaced were worked as coolies. Deficiency diseases like beriberi were still a real danger, and caused loss of life.

Coolie base hospitals were even established in appropriate areas, and the most severely ill in camp hospitals were evacuated there, though the railway was seldom available, and during the long waits for trains many men lost chance of recovery. Thus the death rates at base hospitals increased.

While only slight headway was being made with the exceedingly grim and unpromising tasks of the latter part of 1943, "K" Force members had consolation in being able to mix a little with their colleagues in the prisoner-of-war groups and camps on the line. They acted too as medical officers for outlying detachments of the prisoners of war, whose own medical officers they could relieve to some extent. This was favoured by the movement which went on during the constructional phase of the railway, and the coolies' medical officers appreciated the hospitality and friendship of the British and Australian camps.

In September 1943 when a sick camp was formed at Kanburi for the men of "F" and "H" Forces, much help was given by Captain T. G. Hogg and orderlies from "K" Force, which with "L" Force did much of the pioneer work in that camp.

For short periods too, Major Davies and Captain Hogg worked in a Japanese laboratory at Kanburi, doing routine bacteriological work for the camps in the area, and some help was also given by "K" Force members in small Japanese hospitals. Captain J. L. Frew, A.A.M.C., and Captain Wallace, I.M.S., who had previously done anti-malarial work in the Nieke-Sonkurai area also worked with a Japanese mobile bacteriological unit for nine months. They were able to work with freedom, and carried out valuable diagnostic and investigational work for both prisoner-of-war and coolie camps of the area.

The second period of "K" Force activities was between August 1944 and April 1945, during which the accurate Allied bombing of Japanese targets caused a deterioration of the rations and general conditions of the prisoners of war.

On 6th April 1945 "K" Force was transferred to the Thai prisoners of war administration, and members of the force arrived at Tamuang, where they found a great improvement in conditions. Rations were better, and Red Cross supplements were distributed for the use of the sick. At Takri, however, conditions were poor and health standards fell accordingly. "K" Force's observations with the prisoner-of-war groups showed that malaria

was universal, and dysentery very common. In general, deficiency disease was common in isolated groups of men, particularly "wet" beriberi; the vitamin B2 deficiency states were very common in 1943 and again just before capitulation, but never so severe as in Changi during 1942. "K" Force lost only two of its men by death during its sojourn in Thailand.

"L" Force

This combined force worked chiefly in association with "K" Force. It was commanded by Lieut-Colonel H. C. Benson, R.A.M.C.: with three officers and seventy other ranks of the A.I.F. under Major H. L. Andrews, A.I.F. "L" Force left Changi on 23rd August 1943. The usual information was given that the force would work in well equipped hospitals and no medical equipment need be brought. Some general equipment was carried.

After a rail journey in closed trucks they arrived at Kanchanaburi, in Thailand on 29th August. Here they found some fifty members of "K" Force engaged in labouring work and camp fatigues. Major Andrews made a formal protest to the Japanese, stating that medical personnel were being used for non-medical work, and that their employment on civilian work was in defiance of international conventions, and that "L" Force, asked for as a definite force, should be retained as such. This protest was made in view of the immediate steps being taken to sub-divide the party. As a result Andrews was sent up to Nieke, but forty-five of "L" Force remained in the base camps, with some of the British personnel, and were used to staff the hospitals. It would appear that the Japanese themselves recognised the evil reputation that the up-country camps had earned. The base camps were, in the troops' phrase in the "egg belt", where chance of survival was greater. The chief coolie hospitals where "K" and "L" Forces worked in 1943 were at Wanye, Kinsayok, Konkoita and Nieke, in addition to the base at Kanchanaburi. Later some of the members of these forces were moved into camps in Burma, but were transferred south when the general movement began.

Major Andrews found that in the later period of work, in 1944 medical and surgical supplies improved, though such items as plaster of Paris, catgut and instruments were almost unobtainable. He was able to borrow Japanese army clasp knives for surgical use: these had a small saw-blade which could be used for amputations. The Japanese medical officers were uninterested in coolie patients and hospitals, and, as previously mentioned in speaking of "K" Force, the Japanese-trained Malayan dressers showed almost equal apathy.

"L" Force was able to give valuable assistance to the sick of "H" Force on their arrival at Kanburi, and their medical officers and orderlies provided a timely service for these exhausted men.

The later movements of "K" and "L" Forces did not conform to the original intention, which was to return them to Singapore, and eventually their separate identity was lost. However, in improving the standard of medical care for civilian labour they benefited the hygiene of the camps

in general, and they also helped in establishing a large base hospital for prisoners of war. "L" Force alone of all the forces sent to Thailand, did not suffer a death among its own members.

2. BASE HOSPITALS

Japanese hospital arrangements in Burma and Thailand fell into three phases. The first of these was from August 1942 to September 1943 when the appalling conditions in the railway construction camps caused degrees of illness beyond the capacity of the utterly inadequate organisation provided in the jungle hospitals. The sick population of the camps was so greatly in excess of anything the Japanese had expected, and the system of evacuation was so poorly developed and chaotic that hospital bases in relative accessible areas became necessary. Labour concentrations in Burma called for hospitals in Burma; consequently the Japanese chose sites at Tavoy, Thanbyuzayat, Retpu and Kohn Kuhn (55-kilo). The conditions and medical work in these areas have been described earlier in this chapter. When "F" Force was brought up to the northern group of Thailand working camps hospitals were developed there, most of them quite inadequate. At the Sonkurai group of camps such hospitals were set up, and also at Takanun, but in addition a new base was established at Tanbaya in August-September 1943. Tanbaya was much nearer the Burmese railhead, and housed many of the sick of "F" Force.

During this first phase the need for hospital bases at the southern end of the line also became apparent; mention has been made of the establishment of a hospital at Konyu and Kinsayok, in the central camp group, and in a number of areas in the southern group, such as Non Pladuk, Chungkai, Kanburi and Tamarkan.

With the completion of the railway in October 1943 the second phase began. This saw the establishment of a hospital at Tarsau, at the southern end of the central group of camps, but within the jungle belt. During this period from September 1943 to March 1944 the relatively fit men who were employed on maintenance work on the line were looked after at the nearest camp hospital, and the more seriously ill were concentrated in the hospitals, where great resource and energy eked out the meagre facilities and supplies provided by the Japanese. By this time the pressure of the captors was slightly relaxed, and the captives' organisation was able to achieve some degree of success in its medical work. The third phase lasted from March 1944 till the end of the war; during this period some of the working forces, or their remnants, were returned to Singapore, and the sick were concentrated in hospitals which, though still crude and insufficient, were characterised by greater cooperation and less interference. These hospitals were sited towards the southern end of the railway, and have been described, not unjustly, as "face saving". The gradual movement of medical centres to the south was associated with considerations of supply and communication, and they represented a definite advance on the shocking standards previously seen in camp hospitals. At the time of capitulation of Japan there were still large base hospitals at

Chungkai, Tamuang, formed by fusion of three other camp hospitals, and Nakom Paton, the huge hospital terminal which housed as many as 8,000 derelicts from the railway project.

Reference has been made to the hospital work during the first two phases, and this may be now amplified in some directions.

Takanun, about 140 miles from Bampong like most of the hospitals in the central region suffered severely from cholera, and the mortality rate was high. Its daily average of patients was usually about 500 to 600.

Konyu held from 1,000 to 2,000 patients, many were seriously ill, and many died from various causes. It was at first built on a low bank of the Menam-Kwa Noi River but flooding necessitated its movement to higher ground at the beginning of the 1943 monsoon.

Kinsayok, about 107 miles up the river from Bampong, was about the same size as Konyu and was rapidly reduced in numbers once the line was completed, but was retained as a maintenance hospital camp till the end. In September 1943 there were still 2,000 to 3,000 prisoners of war in the area. It was a bad site in wet weather, and the accommodation then consisted of the usual tattered tents and hovels which let in the rain. The Japanese agreed to erect new huts, and these, with new and more hygienic sanitation lessened the ordeals and dangers of the patients appreciably. Rations and purchased food supplements helped to improve conditions, and canteen supplies could be obtained from the barges, as the river flowed past the camp. Relations with the Japanese were reasonable, but as in other camps some of the Korean guards were cruel and violent. Members of "D" Force from Changi helped the supply position by bringing some of the scanty stores they had brought with them, and some drugs could be bought locally.

Some primitive surgical work was possible, using instruments carried by medical officers. When the new buildings were erected improved access to the patients was provided in wards by using longitudinal platforms for the sick, with passages between, though the Koreans doing the work often refused to conform to the agreed plans. A small earth-floored operating hut was provided, and a special ward kitchen was organised. Lieut-Colonel Dunlop, who introduced these changes, acted as commander and senior surgeon and Major Corlette was in charge of the medical inspection division, and Major Bennett, R.A.M.C. was registrar. A camp fund with common subscription rates was formed: this organisation made good use of its slender resources in purchasing necessities from friendly people of the country, and did much to alleviate the conditions of the sick. The willingness of the Japanese at this stage, October 1943, to conform to less primitive and unreasonably bad standards of prisoner treatment was an early indication of a change in outlook. At the same time, it meant that increasingly difficult problems were to be solved at the base hospitals. The barges passing down the river to the hospitals in the south carried dismal human derelicts, too crowded for the use of stretchers, reeking with dysentery and septic ulcers. The battle with disease began in the

camps and camp hospitals along the river, and it was continued in the established hospitals farther down.

We may now turn to some further aspects of the work methods and experiences of some of the larger base hospitals, which have already come into the story of the movements of the large labour forces, such as "F" and "H" Forces.

At Kanchanaburi, a village near Kanburi, as we have seen, Lieut-Colonel Malcolm, R.A.M.C. started a hospital in January 1943. This area was, like numbers of others, known only too well to those who marched and staged there from Bampong. In the middle of the 1943 monsoon nearly a thousand patients were there, most of these evacuated from the jungle camps and camp hospitals. In the early stages of construction and organisation there were many obstacles to surmount, but in August 1943, though the problems were more serious, the Japanese gave practically no assistance. Drugs were almost entirely expended, skin diseases were very common, typhus appeared, as well as cholera and diphtheria, and tropical ulcers were severe and numerous. There were hardly any dressings to use on these ulcers; the best results seemed to follow cauterising the lesions with pure carbolic. Major de Soldenhoff and Lieut-Colonel MacFarlane performed appendicostomy as an adjuvant to the treatment of inveterate amoebic dysentery and reported excellent results. Except that the Japanese were not cooperative their treatment of prisoners here was reasonable, but the same could not be said of the Korean guards. On 18th December the hospital was closed; hygiene was then becoming an increasingly difficult problem on account of restrictions of space.

In July 1943 the first movement began in the transfer of sick from "H" Force to Kanburi, as part of the plan to send the remaining men of "F" and "H" Forces to southern concentration areas on completion of the railway. The staging camp at Kanburi had been, as we have seen, in a state of utter neglect: at one time Captain V. Brand, who was unable to march, was retained there to look after 500 seriously ill men. Fortunately hygiene was greatly improved by constructional changes and tightened discipline, and the camp had not been attacked by cholera. Major E. A. Rogers had also persuaded the Japanese administration to allow recovery of medical supplies left at Bampong, and to provide additional accommodation.

Further work was done on the hospital camp in the Kanburi area by detachments from "H" Force, and by some members of "D" Force. In August a party of "H" Force was moved north to Konkoita, but work in the rest of the force practically ceased except for camp duties. The first parties from the mountainous areas in the north arrived at the "H" Force hospital at Kanchanaburi on 27th August. There had not yet been time to prepare full accommodation in the hospital camp and the first arrivals had to shelter in attap huts erected only twelve hours previously. Though these huts only accommodated sixty men without crowding it was found necessary to put 100 men in each hut as the succeeding parties arrived. Many of the men were completely exhausted when they reached Kanburi,

and as many as 800 sick men many of whom were seriously ill could only be given a minimum of attention by a hospital staff consisting only of one medical officer, one nursing orderly and two non-medical N.C.Os., supplemented by volunteers from the less seriously ill. Fortunately Major Marsden, S.M.O. of "H" Force and a party of nine medical officers and sixty orderlies from "L" Force arrived, and improved the situation greatly, though medical supplies were very scanty and the diet of hospital rations was crude for sick men. The strain of the long journey by barge or train was severely felt by the sick, and the effects of their previous privations was made manifest by a continuing high death rate from malnutrition and inter-current infections. On 9th September, Lieut-Colonel Humphries, the commander of "H" Force arrived with ten officers including Major Fagan the surgical specialist and 154 fit O.Rs. It was then possible to build a camp for fit men two and a half miles from the hospital. By the end of September there were only about 100 men in the "fit" camp, the remainder of the force being in hospital.

A little later the move of "F" Force from Tanbaya hospital in Burma and Shimo Sonkurai and other camps in the vicinity further increased the hospital population at Kanburi. During October the demands on the parts of the force still left in working camps were abated, but with notable inconsistency the Japanese made prisoners carry back railway gear from Nieke to Taimonta and Konkoita. Further, when the first party of 500 men, those who were the most physically fit, were assembled for travel to Kanburi only enough trucks were provided for fifty men and the remainder had to march to Nieke to join a train there. Orders were also issued that 400 patients from the camp hospital at upper Sonkurai should march to Sonkurai and on to Nieke, but after strong protests this direction was cancelled. Eventually, on 26th November all the men of the force in this area were entrained, without regard for arrangements made for care of stretcher patients. A small detachment was left to look after a few dying men.

Meanwhile the move of patients from Tanbaya was proceeding in parties of 200 on successive nights. By 24th November all had been placed on trains with the exception of 218 who were too ill to withstand the long journey, estimated at fifty-six hours. No stretcher patients were taken. Thirty-three patients were accommodated in each truck; most of the trucks were open. Ten officers and 310 O.Rs. were left, including 5 medical and administrative officers and 96 O.Rs. for medical and general work. Seventy-six of the patients belonged to the A.I.F. When the main hospital party left Tanbaya there had been 665 deaths, made up of 45 per cent of the British and 21 per cent of the Australians in the total population. In spite of all the medical care that could be given this hospital illustrated the causes of deaths in such bases; poor diet, lack of drugs and the effects of previous bad conditions and hardships.

On their arrival at Kanburi all the men were exhausted, even those relatively fit from the working camps. The advance party was not permitted to make arrangements for the reception of succeeding groups for

whom adequate accommodation was often not ready. The parties arrived irregularly, frequently at late hours, and the journey took much longer than the expected time. By the time the whole of "F" Force had arrived 100 more men had been admitted to the hospital prepared by "H" Force. Some of the sick remaining in Tanbaya were transferred to Kanburi in December, but the rest of the survivors did not return till April 1944. When all the sick of "F" and "H" Forces had arrived twenty-eight wards of the hospital were fully occupied with men suffering from malaria, beriberi, tropical ulcers, dysentery and related diseases, and skin lesions. From 28th August to 8th December 142 deaths occurred in "F" Force and 264 in "H" Force.

As the numbers in hospital grew rations became worse; Lieut-Colonel Benson, R.A.M.C., the officer commanding the hospital made frequent complaints that the ration as received was on starvation level, and the men were dying of malnutrition. Firewood was always insufficient and had to be supplemented by purchases from the camp funds.

Soon after the two forces arrived in Kanburi the Japanese representatives announced that two parties of 500 fit men from "F" Force would be required for work at an indefinite destination to which they were soon to move. This was manifestly impossible without including some sick; the second party could only be made up by using a preponderance of Australians. On 2nd December the men of the first party went by train to Bangkok docks where they stayed a week, and on 10th December sailed as "deck cargo" on a 4,000 ton steamer, which disembarked them at Singapore on 14th December after a reasonably comfortable journey. The other parties were less fortunate and travelled by train in the usual discomfort. One small party went to Sime Road Singapore with "H" Force, and the remainder were sent to Changi. So "F" Force returned to familiar surroundings, and pleasant reunions, but leaving over 1,000 Australian dead along the Burma-Thailand railway.

"H" Force, with the majority of its patients, 1,057, was sent from Kanburi by train on 8th, 9th and 10th December, leaving sixty-two seriously ill men behind. These men, some not expected to survive, were transferred to "F" Force in Kanburi. The rest of the force, one-quarter of its strength lost by death, arrived at Sime Road, Singapore, where the force as such was dissolved and came under other administration.

After the end of 1943 the policy of concentration of base hospitals was more consistently applied. Small numbers of relatively fit men were left on maintenance work; and were gradually subjected to less pressure by the Japanese. The remaining hospital camps in the northern and central sectors became less important. Takanun, 140 miles from Bampong, was closed in April 1944. Tamarkan, opened about the same time, under the administration of Major Moon, A.A.M.C. but in December 1943 its patients were transferred to Chungkai. By January 1944 most of the prisoners of war were concentrated in the Kanburi area, where there were three camps, Tamarkan, Kanburi (1) and Kanburi (2). Working parties were small, and the rights of the sick were more respected. The hospital

in Tamarkan held 1,500 patients when the evacuation of the Burmese camps was concluded, while the camp in Tamarkan had a strength of 4,500. Lieut-Colonel Hamilton S.M.O. of "A" Force, arrived there in March 1944. Later, in May, Hamilton incurred displeasure by making a just complaint to the Japanese camp commander about guards who had beaten the sick at Takalin, and was sent as medical officer to Non Pladuk with a small party of men who the Japanese considered were undesirables.

Tamarkan was one of the better base hospitals; though the accommodation was the usual bamboo platform type of hut, with 250 patients to a hut, there were a number of amenities established. A canteen, was, however, difficult to run, as most of the officers had had no pay for some months. Patients with infectious diseases were isolated, and care was taken not to introduce cholera into the area. In July the hospital reached its peak of over 2,000 patients; it seems incredible that a Japanese medical orderly who had only the qualifications of a rice labourer was "in charge" of the patients. After this man left a better order of things began, dietary additions made an improved though still inadequate ration, some drugs were obtained from various sources, and a small operating theatre was equipped. Particularly precious was a supply of emetine enough to treat all the patients with amoebic infections. This and other therapeutic successes did much to raise morale. Major Moon commanded this hospital during part of 1943 and did excellent work there. In December the staff from Tamarkan was moved to Chungkai and Kanchanaburi; the patients were transferred to Chungkai.

Before proceeding further with the story of the southern group of hospitals some of the developments in the large hospital at Tarsau will be described, as these illustrate administrative and technical methods evolved to give the sick a better chance of survival.

Tarsau was the main base for No. 4 Group of camps for prisoners of war in Thailand, which held 13,786 men. It was established in November 1942, and treated 15,029 sick with 805 deaths up to the date of its closing in April 1944. The patients lay closely crowded on bamboo platforms in huts made of bamboo and attap, which were constructed by the prisoners themselves in a jungle clearing on the river, overlooked by rugged mountains. By permission of the Japanese Lieut-Colonel Dunlop visited Tarsau several times to see how the Australian patients in his area were faring. Between May and August 1943 the Japanese pressed the labour forces ruthlessly, and the sick and death rates rose alarmingly. Lieut-Colonel W. Harvey R.A.M.C. in command was, however successful in obtaining some help and concessions from the Japanese, and though the huts were leaky and decrepit, and the sanitation incredibly bad, a reasonably good operating hut was provided with a built up bamboo floor and table. A microscope and a few other facilities were also provided, but surgical equipment was extremely meagre.

Dunlop found pre-Listerian conditions in the wards, but the problem of spreading infective gangrene, which was then rampant, was tackled after

a conference with the staff. A system of sterile irrigation of wounds and ulcers was set up, orderlies were drilled in procedure and efforts were made to buy carbolic and iodoform at any price. Harvey was unable to secure enough water containers, without which mess gear could not be sterilised, but Dunlop promised to send all assistance in money or kind as it was possible to collect in the area. A little later Harvey as S.M.O. decided that Dunlop should administer the hospital, and the Japanese commander agreed.

Determined efforts were made to secure enough material and labour to rebuild defective huts, to provide better accommodation for the seriously ill, to extend and improve the sanitation, and to organise the duties of the wardmasters. As the nights became cold great hardship was caused to patients who had no blanket: the Japanese helped somewhat by providing mats and rice sacks. The Japanese gave some help in certain of these projects, but despite sympathetic consideration they did not supply essential drugs and dressings. Better treatment of the alarmingly destructive and lethal septic ulcers was devised, chiefly by improvisation, and small quantities of flavine and sulphanilamide were obtained. Dietary supplements were investigated, and despite the high cost, purchases of eggs, condensed milk and fruit were made from the Thais. At the end of 1943 there were 450 men needing special food; in the interests of all patients improved methods of serving food were introduced, and bakery ovens were improvised from officers' tin trunks. Concerted effort also produced a supply of ward and hygiene equipment.

A few cases of cholera were occurring in Tarsau, and the consent of the Japanese was obtained for the establishment of isolation quarters, special measures were taken to prevent spread of infection, and stills were pressed to their capacity to distil water.

The causes of death were examined; it was found that infections, particularly of the digestive system accounted for the greater number. In order to clarify the position an improved records system was drawn up. Further representations to the Japanese was successful at this time in obtaining a supply of drugs; very little emetine was produced, but the dire need of this drug was met by the use of more devious and courageous methods.

Clinical study was encouraged among the staff, and amenities of occupational and diversional kinds were established in the interests of the patients. One useful feature was the promulgation of periodic hospital bulletins which explained the needs of the establishment and the efforts being made to supply them. Even in technical matters such as treatment of scabies, appeals to the patients themselves produced good results. The amount of suffering and invalidity saved was considerable, and this was not only due to organisation, but also to the good work of the staff, particularly Captains C. Vardy, J. McConnachie and J. Street of the R.A.M.C.

When Tarsau base hospital ceased work in April 1944 both the sick and the relatively fit men, unless returned to Singapore, were being con-

centrated more and more in the southern areas, where another and important factor in the disposition of base hospitals now arose, bombing of the railway line by Allied bombers.

Air Raids. After the work of the railways camps was centred on more southerly areas the line proceeded to completion without repetition of the early air raids on the Burmese bases. As the Allied air forces were able to use long range bombers from airfields strategically convenient for attack on the southern part of Thailand, so the risk of damage to the railway increased. The prisoners of war themselves knew enough of the conduct of the war to comprehend what this meant to them as well as to their captors. On 6th September 1944 Non Pladuk was severely bombed, and unfortunately over 100 prisoners were killed and some 400 wounded. Several raids on Non Pladuk immediately followed, in the third of which railway sidings and workshops, and machine shops were destroyed with nine deaths.

On 29th November Tamarkan was attacked and eighteen men were killed and sixty-eight wounded. On 2nd, 8th, 10th and 13th December railway sheds and dumps were damaged at Kanburi, and more important, the railway bridge was paid special attention. On 8th December mass air raids were made from the Burmese border to Kanburi, killing 41 out of 111 casualties. The concrete railway bridge at Tamarkan was repeatedly attacked, and prisoners were hurriedly assembled to undertake repair work. Eventually the bridge was destroyed in February 1945 and only a wooden bridge left which also underwent repeated damage needing constant repair by the working parties.

After the raids of December 1944, air activity increased in frequency and continued attacks were made on the line until the capitulation of the Japanese eight months later. In fact, raids in the vicinity of the prisoner-of-war camps were frequent events after the big raid on Non Pladuk. The effect of this bombing was manifest in other directions than those of material damage. At first the Japanese refused to sanction measures of preservation such as slit trenches but this policy was soon changed, although guards would sometimes refuse to allow workers to take cover. Demolition bombs caused damage in some of the camp areas, and low level attacks also caused casualties through machine-gun fire. The sick naturally felt the strain of these attacks and some showed evidence of anxiety states. Tamarkan became an uncomfortable place for a hospital, and when in February 1945 the camp was evacuated to Chungkai great relief was felt. Changes in camp siting were in the first place related to the movement of the various bodies of prisoners of war; early in 1944 for example the headquarters of Nos. 3 and 5 prisoner-of-war branch in Thailand was at Tamarkan, and after being moved to Chungkai this was again moved in June to Tamuang. Resentment was felt against the Japanese when they refused to allow men to go to cover, especially when unnecessary casualties were caused. They also refused to permit a red cross flag to be displayed over the hospital when a request was made after a heavy raid at Tamarkan. In target areas camps were moved,

or closed or transferred to other sites for reasons connected with air attacks and the actual and potential damage they caused. The prisoners of war might easily have suffered more casualties in some areas, especially when pattern bombing was used, and they had occasion also to appreciate the accuracy with which specific targets were found without more serious human damage.

The medical services dealt with the casualties of these air raids as quickly and adequately as possible. When Tamarkan was raided the whole staff did excellent work, and in one of the later raids eight orderlies rescued two seriously wounded men while the camp was under fire. When the hospital was evacuated a surgical team, Major Hobbs, Captain Simpson and six orderlies remained with the rear party till the movement was complete. At Chungkai later some severe wounds needed surgical treatment, in one case amputation was necessary.

Wounds from bombing raids in the southern camps were usually dealt within one to five hours. Sometimes the interval was longer when wounded were brought in from outlying camps, occasionally as long as several days owing to the entire lack of equipment at more distant working camps. Even these delays did not prevent recovery in most instances, though suppuration was common. Most of the traumatic surgery was performed under spinal or local anaesthetics, but the Japanese provided small supplies of ether and chloroform after the air raids. This work and even the most primitive ward routines were carried out with difficulty increased by the lack of ordinary conveniences. For example, in February 1944 hot water was only obtainable at one point in a hospital serving over 2,000 sick men.

Some further account may now be given of the medical work carried out in the hospitals at Chungkai, and Tamarkan, established since 1943, and Tamuang formed later by fusion of three hospital camps farther up the line.

Chungkai was one of the first hospitals established towards the Bampong end of the railway, and had to cope with large numbers of men who were severely malnourished and suffering usually in addition from several infective conditions, the aftermath of the working camps of 1943.

Chungkai was opened as a working camp in September 1942; its base area was at Bampong, and there was no hospital, the sick being treated in living huts. In October Major Black R.A.M.C. became S.M.O., but only in November was a hospital area put aside, and huts were built in a low-lying site liable to flooding. Major Pemberton, R.A.M.C. arrived with a surgical team and began work in a primitive theatre. By the beginning of 1943 more medical staff had collected and the Japanese began to send patients from up-country camps. Major Black left to go as S.M.O. to another camp, and was succeeded by Major Reed, R.A.M.C. By March the hospital was grossly overcrowded, and had to deal with an epidemic of diphtheria for which no antitoxin could be obtained with the result that out of fifty-seven men ten died. By May over 1,000 patients were being treated in Chungkai, with grossly inadequate drugs and dressings.

In June 1943 Chungkai became the hospital base for all the up-country working camps south of the Burmese border, and received ever growing numbers of sick men, herded into train trucks or crowded on barges, hungry, wet, emaciated and often dying. Their state did not always protect them from brutal treatment by Korean guards. The conditions in the skin and ulcer wards, where 1,000 patients out of the 2,000 in-patients in hospital were crowded, were appalling. Men were dying from deficiency diseases for which little could be done. In the middle of the month cholera broke out, and after great efforts the staff persuaded the Japanese that cholera was in their midst, and managed to isolate the sick and to stay the spread of a general epidemic.

As in Tarsau successful organisation raised funds for the surreptitious purchase of essential drugs and supplies, and extra food. Such amenities as could be devised were provided, and a remedial department was also established. In August the hospital area was flooded; only one-quarter of the establishment was habitable, and in the midst of the most unfavourable conditions for any critical medical or surgical work cholera reappeared. Major A. L. Dunlop, R.A.M.C. acted as physician and also as registrar, and carried out much valuable work in organisation. By September there were 2,000 patients to be cared for: it was not surprising that in October 257 died. Captain Markowitz carried out work of a high order both in surgery and in extemporising methods and instruments, and performed over 100 amputations for ulcers. In January 1944 Lieut-Colonel E. E. Dunlop, A.A.M.C. took over the command, and as the peak period of difficulty passed was successful in introducing a rearranged scheme of hospital finance and a comprehensive diet scheme. As the large hospital base at Nakom Paton had now been built the Japanese transferred 1,000 sick patients there. In May Lieut-Colonel Dunlop left for the central group of camps, and Major Pemberton returned as S.M.O. In July the Japanese issued a liberal supply of drugs from the American Red Cross, of great value, but too late to save many who had died untreated. The hospital was now flooded again, and the Japanese selected patients for transfer to Tamarkan, and officially at least, closed Chungkai. However patients still needing treatment were kept more or less secretly in battalion huts. The bombing of Tamarkan produced an ironical situation, as the Japanese then re-opened Chungkai, and built a new theatre and administrative block. Chungkai was thus of use again, and during late 1944 and early 1945 received many patients from the drafts sent up-country for maintenance work; most of these men had malaria; for which drugs were insufficient in supply. In June 1945 Chungkai was finally evacuated, the remaining patients going to Tamuang.

Tamuang was late in its organisation, June 1944 and exemplifies the third and final phase of the Burma-Thailand experience. This phase began about March 1944 and lasted to the capitulation. The incidence of severe illness fell, owing to the lessened strain on the prisoners of war, the food supplied was somewhat better, general restrictions were relaxed to some extent, and the general set-up of hospitals showed a "face-saving"

attitude on the part of the Japanese. Extemporisation and organisation of medical and surgical work allowed a higher technical standard, even though the surroundings were still extremely crude.

Tamarkan, Chungkai and Tamuang. During the final phase of medical work in Thailand the conditions were fairly similar in Tamarkan, Chungkai and Tamuang, though all did not operate for the same period, and Tamuang, the latest built, showed special evidence of some change in the Japanese outlook. The following account of these conditions embraces certain features of the work carried out in the base hospitals of that period. Early in 1944 the daily ration was about 2,300 Calories, with 50 grammes protein and 20 grammes fat, and often the figure was still lower. This was offset to some extent by local supplements, by which about 2,600 Calories could be provided. Most of the useful dietary additions such as kacang ijau and pork fat were expensive, but where the sick required special nutriment they received even a better diet than others in the camp.

The nature of the diseases occurring in the early part of 1944 and the later part showed some differences. Dysentery and nutritional diseases were very common in the early period so too was benign tertian malaria and severe tropical ulcer. Amputation through the thigh or leg had been done on about 120 patients in Burma, but this was seldom necessary in Tamarkan. In the second half of the year malaria assumed a dominant role, owing to the scarcity of quinine, and most of the infections were of the malignant tertian type. For this reason cerebral malaria, blackwater fever and severe anaemia were more frequent. Pellagra and beriberi though still common, assumed a milder form. Skin diseases were less troublesome, and the septic ulcers became less severe. Diphtheria, which at an earlier stage had been prevalent in large tropical ulcers, and at one time called for a special isolation ward, was becoming uncommon. In April 1944 all the men with amputations, and those incapacitated or suffering from chronic diseases were transferred to the base hospital in Nakom Paton.

In July some stores arrived from the American Red Cross; atebirin and iron were then available for the first time. Emetine and sulphaguani-dine also arrived, much to the benefit of dysenteric patients. The emetine though in small amount only, supplemented that made by Captain Van Boxel from ipecacuanha.

Pathological work was carried out by Sergeant F. H. Atherton; he found the principal malarial vector to be *A. barbirostris* which bred just outside the camp, and made the microscopic diagnosis of malaria on a large scale. Dengue was also found in Tamarkan and other camps, due to breeding of the *Aedes* in drums of water. Stool examinations showed 20 per cent of *Ankylostoma* infection and 50 per cent of *Strongyloides*.

The work on blood transfusion carried out in the hospital bases in 1944-1945 was of particular value. Captain Van Boxel and Lieutenant Roberts, non-medical officers performed successful transfusions on a large number of men, using first the defibrination method introduced by Captain

J. Markowitz and later the citrate method. Grouping was checked with test sera obtained from volunteers and with cross matching.

Operative surgery was performed in these hospitals under sketchy but quite effective conditions. Floors were usually of earth, though in one instance bricks were used. Smooth bamboo matting was used to make movable skylights and walls which could be washed, and netting curtains excluded insects. The table was made of wood in the camps, and sterilisers and autoclaves, stills and metal splints were made from the drums and similar materials to hand. Instruments brought from Singapore were carefully guarded and looked after: a few had been taken by the Japanese; the only other source of supply was a welcome supplement from the American Red Cross in July 1944. Urgent abdominal operations were performed and those required for tropical ulcer, subcutaneous abscesses which were very common, and empyema. Non-urgent operations were seldom performed at first, except those for haemorrhoids and other anal conditions which were common owing to the prevalence of dysentery. Later in the year the arrival of some surgical supplies made it possible to perform various non-urgent operations. The Japanese also began to insist that men with hernia should either work or be operated on. The results of these deliberate procedures were very satisfactory without trouble from wound infection. Tropical ulcers still demanded some radical operations, such as excision of tendons or muscle, removal of sequestra, or even amputation. However these later experiences pointed strongly to the influence of nutrition, for the men when better fed had less trouble with extension of the necrotic process to deep structures, such as bones, joints, tendons or muscles. Good results were obtained in less severe forms by removal of sloughs and the application of iodoform. McGuire's solution of copper sulphate, carbolic acid and water was also found useful after cleaning or excising the ulcer.

Extemporisations which have been mentioned more than once in other places, were a feature of the work in the base hospitals. At their inception these institutions, at their best crude in the extreme, had none of the ordinary facilities for work of even the most rudimentary standard. The prisoners helped themselves by giving from their scanty pay for local purchase of material, and from their personal possessions if any. The convalescent and lightly sick were encouraged to make articles for common use. Even with some repetition no account of the hospital work at this stage would be complete without listing some of the articles made, such as the following: trays, buckets, bed pans, commodes, urinals, sterilisers made of tin and mud, oil lamps, tables, brooms, mugs, ladles, basins, funnels, irrigating apparatus, charcoal, pneumonia jackets, pillows and mattresses made of rice sacks and straw, surgical and orthopaedic apparatus, such as splints, pulleys, suspension gear, stretchers, special beds, leg rests, kitchen implements such as vegetable scrapers, boxes for instruments, clogs, fly traps, and hygiene apparatus such as fly-proof lids for latrines and disinfectors. Special instruments were devised ranging from those used for dressings including bamboo needles, to retractors and suc-

tion pumps and even proctoscopes, and the ophthalmoscope made by Major Hazelton. Catgut and alcohol were also made in the camp.

Apparatus for physiotherapy was made and used in special rehabilitation departments. The making of artificial limbs in Changi has already been described. This ingenious work was duplicated in several hospitals, and limbs were made and worn with success ranging from a simple pylon model to more elaborate types. Artificial eyes were also made. The establishment of hospitals workshops was designed to meet the need for equipment, which was second only to that of food. In the hospital bulletins a special appeal was made to patients to contribute material, and to patronise the arts and crafts centres set up as part of a rehabilitation scheme for long-term invalids. Woodwork, carpentry, tailoring, cobbling and tin-smithing were the main activities, and articles so produced were sold at low prices. Actual appeals for material at Chungkai may be quoted:

There is a desperate shortage of such essential materials (for artificial limbs) as screws, wire, sorbo rubber, elastic and rubber bands, old braces, soft leather or webbing. Artificial eyes can be made from white mahjong pieces: more of these are required.

The following articles are urgently needed: tins and containers of all sorts, solder, flux, nails, wire, screws, sorbo rubber, scraps of clothing, hose tops, old socks, string, webbing, scraps of leather, rubber tubing (for transfusion purposes), glass bottles of all sorts, glass tubing, canvas, elastic or rubber bands or strips, tools of all sorts. Nothing is too old. Nothing is too small.

During this later period, despite some general improvement in the conditions, deficiency disease still showed its menace. Even those men who had lived in base camps for months showed nutritional deficiencies in increasing numbers. Beriberi was not so common as those states due to lack of the *B2* part of the vitamin *B* complex. Definite signs of a spastic paresis in the lower limbs were seen, and recognised as one of the results of the pellagroid group of deficiencies due to lack of the vitamin *B* complex.

During the later months of 1944 and up to the time of the Japanese capitulation there were further evidences of a changed attitude towards the prisoners of war. Some attempt was made by the Japanese to assist in stemming the wastage of life and health, and incidental to these efforts was the display of external marks of consideration. This was seen in Tamuang to which base camp the patients from Chungkai were removed in April 1945. "Window dressing" was now a policy of the Japanese. The hospital was rebuilt, new kitchens were constructed, of a degree which was elaborate compared with anything seen before in the railway camps. Even brick structures were built, gardens were made and flowering plants brought specially from Chungkai and elsewhere. At the same time the jungle camps remained on the previous poor level and death rates there showed no lessening. Though general conditions improved and restrictions were relaxed at these big terminal hospitals in 1944, the Japanese still showed in other places that their hostility to the sick and their opposition to any measures adopted by the prisoners for their own well-being were grim realities. Their frequent stultification of constructive administration,

their demands on the unfit, and their addiction to unnecessarily harsh parades and checks on prisoners were not far in the background. Even in Tamuang, not long before the end of the war, patients were discharged forthwith on arrival by a Japanese medical officer and made to work. A little later the medical sergeant directed that the number of patients then in hospital must not be increased. However the spirit of the men, even of the sick, was high and all possible measures were taken to foster this in hospitals where it was only too easy for suffering to be the one common bond.

Dunlop describes the early months of 1944 as "a period of terrible aftermath of the railway construction" and the concentration areas as "cities of sickness". In Chungkai as in Tarsau he found it valuable to publish bulletins which acquainted everyone with the current facts and the progress made. In these bulletins stress was laid on the growing need of dietary extras, which in turn needed money for local purchase. The officers made handsome contributions from pay for this purpose, and it is of interest to study a sample balance sheet of the self-contained financial efforts of the prisoners of war to help those in want (see appendix). By these means it was possible to provide special diets containing milk, sugar, eggs, vegetable soup, rice, meat and fruit, according to supplies and the patients' needs. Welfare officers, officers in charge of wards and ward-masters were acquainted with all details of the diets and the need for strict supervision. Death rates showed an immediate decrease with the introduction of such new diets, and although at the period under present consideration, when the heavy hand of infection and privation was still laid on thousands of patients in hospital, many men were in a very precarious state of health, a definite advance was achieved.

Nakom Paton. We now turn to the establishment of the largest of all the hospital camps, Nakom Paton. From the later part of 1943 there had been rumours in Burma of a large hospital to be built near Bangkok to house up to 10,000 men suffering from serious or chronic maladies. At the end of January 1944 some 150 convalescents and medical staff moved to Tamarkan and thence to Nakom Paton. Major Fisher comments that they were "disappointed but not surprised to find no hospital", just a working camp of 1,500 prisoners of war. Three months of labour lay ahead of the prisoners, who with the help of native labourers built a hospital of fifty huts each designed to hold 200 men, allowing a space of one metre per man. The medical orderlies shared in this work, and levelled sites, did general navvying, made roads, dug drains and transplanted trees. Timber and attap were available for building the huts. Latrines were on an improved model, cubicled, with squatting holes over concrete lined trenches 4 feet deep. It was necessary to empty these trenches to a 30-gallon tub which had to be carried to a cesspit. Cook-houses were built on an allowance of one per 1,000 men: they had concrete floors, water tanks, fire places and kwallies (cooking vessels). The water supply was inadequate but was later improved by sinking deep boreholes: the water of course required boiling. An elaborate canteen hut

and a concert platform were welcome amenities. One of the greatest drawbacks of this establishment was the flat nature of the site which in fact had been used as padi fields. Some huts were untenable in wet weather and acute discomfort was unavoidable for some patients. Nevertheless the area was healthier than most of the other hospital sites, and the stagnant water in wet seasons did not seem to increase the incidence of malaria. The preservation of trees, pools and other natural landscape features enhanced the appearance of the site. The accommodation for lightly sick and convalescents proved satisfactory on the whole, as judged by local standards; the provision of wooden floors was a definite advance. For seriously and gravely ill men, however, it fell far short of even the most rudimentary requirements. Wooden platforms were the only beds provided, and the huts were sometimes overcrowded. There were no hospital beds, no bedding, no linen, no towels, no washing utensils; other human amenities designed to make the lot of the seriously ill more tolerable were absent, except for what could be contrived by the ingenuity of the prisoners themselves. On 5th March 1944 Lieut-Colonel A. E. Coates was asked by the Japanese authorities to take over the command of Nakom Paton hospital, and he was appointed as Chief Medical Officer, also holding the position of consulting surgeon. On numerous occasions he pointed out to the Japanese the many shortcomings of the hospital, and on 22nd November 1944, in a report made at the request of the Japanese medical officer, stated that even one clean and dust-free ward of 100 beds properly equipped would have been adequate for urgent needs. At the time of this report no washing utensils had been supplied and there were very few facilities for ablution or for disinfection.

A separate medical and surgical block was one of the show features of Nakom Paton, with a large wooden hut divided into an operating theatre with concrete floor and large enough to hold three tables; a blood transfusion room with three tables; specialist departments, dispensary and the office of the chief medical officer.

The medical centre was reasonably adequate; its use was really restricted by the limitations of technical resources, though these, as in other hospitals were greatly expanded by extemporisation. The operating theatre had a concrete floor and flywire windows, but there was no skylight, the lighting was very poor, and only improvised oil lamps were available at night. One microscope was supplied and was in constant use by the pathologist's staff, who carried out a good range of pathological and biochemical work so far as the limits of equipment and material allowed. Patients began to arrive in April 1944, and continued in batches of about 1,000.

The staff of Nakom Paton at June 1944 included the following officers: Chief Medical Officer and Consulting Surgeon, Lieut-Colonel A. E. Coates; Medical Adjutant, Captain C. Vardy; Consulting Physician, Major W. E. Fisher; Consulting Pathologist, Lieut-Colonel MacFarlane; Consulting Psychiatrist, Lieut-Colonel Barrett; Consulting Physiologist and Transfusionist, Captain Markowitz; S.M.Os. of ward groups, Lieut-

Colonels Malcolm, Barrett, MacFarlane, Larsen and Dunlop; Pathologist, Major A. T. H. Marsden; Dentist, Major Clarke; Specialists in Ear, Eye and Skin Diseases, respectively, Captain McConnachie, Major Hazelton and Captain Wright; Anaesthetist, Lieut-Colonel MacFarlane. There were in addition a number of other medical officers working in the wards. The work of the hospital was also assisted by an advisory committee and several other special committees, and as other departments became necessary, such as workshops for general and orthopaedic purposes, and a physiotherapy department, other appointments were made.

The surgical department could undertake all ordinary work; the lack of instruments and material was partly made up by pooling equipment and by extemporisations. A total of 896 operations was performed at Nakom Paton, with a mortality of 18; these included 5 craniotomies, 3 laminectomies, 8 drainage of liver abscess, 2 thoracoplasties, and either appendicostomy or ileostomy was performed on 25 patients. Herniotomy was performed 114 times by order of the Japanese, and by using a tested antiseptic technique and employing interrupted cotton sutures and as little catgut as possible good results were obtained. Catgut was successfully made in the laboratory.

In medical wards a wide experience was gained in the manifestations of malaria, chronic dysentery, and amoebiasis. Essential drugs were often lacking, but in the later periods supplies of invaluable drugs such as emetine were available partly from the Japanese, but chiefly from the American Red Cross. Pulmonary tuberculosis was fortunately not common in the camp, among Australians it was rare. Active treatment by artificial pneumothorax was carried out in suitable cases, but tuberculous disease did not respond well under the prevailing conditions, in spite of special dietetic care.

The special departments were very busy and did most valuable work: 25 per cent of the whole camp strength were treated in the skin clinic alone. The pathology department was obliged to make potassium salts from wood ash for some tests, and also made Benedict's solution. Test meals could be done, using syringes instead of burettes, and other simpler biochemical tests. Major Marsden made a useful investigation into the reliability of microscopic diagnosis of amoebic dysentery. Post-mortem examinations were invariably carried out until the Japanese forbade them without special permission.

Continuous interest was maintained in rations. Though the diet was much better than in other camps of the earlier period there were still important deficiencies, especially in first class protein, fat, and vitamins, in particular vitamin *B* complex. The Calories ranged from 2,700 to 3,100; total protein from 50 to 85 grammes, fat from 18 to 51 grammes. An efficient organisation provided supplements to the ordinary hospital diet, and for special diets by the use of special funds, and the British and Australian Red Cross representative Mr Keith M. Bostock gave valuable assistance in this regard. Food extras also arrived from the American

Red Cross. Notwithstanding this, deficiency diseases were still a reality in hospital patients, many of whom had suffered irreversible changes.

On Christmas Day 1944 special efforts were made, towards which the Japanese made a special grant. The canteen produced attractive delicacies, and the cooks prepared a remarkable series of meals, with meat, eggs, several vegetables, sweets and Christmas cake. Services were held, and at night a pantomime was staged. The celebrations included the entertainment of the Japanese officers at luncheon.

Early in 1945 more restrictions were imposed on the camp because of the altered military position, but the prisoners of war were well aware of the reason, and the hospital work went on without hindrance. One technical feature of the medical activities of Nakom Paton deserves special mention, the quality of the scientific side of the work, as evidenced by the high level of the clinical meetings which the British, Australian and Dutch medical officers held regularly. The minutes of these meetings recall the best standards of a teaching hospital.

From 25th March 1944 to 16th August 1945 the admissions and discharges were as follows:

	British	Australian	Dutch	American	Total
Arrived	4,363	1,868	3,190	90	9,511
Discharged	3,271	1,085	2,328	58	6,742
Died	71	21	59	2	153

In August 1944 the camp strength reached a peak of 7,353; by August 1945 it had fallen to 2,868. This huge organisation ran efficiently, and combined the efforts of the different nationalities composing it smoothly and with enthusiasm for a single cause, that of the well-being of the men committed to their care.

THE FINAL PHASE

In spite of the more cooperative attitude of the Japanese in the base hospital camps there were many instances of lack of consideration, as well as humanity, and reasonable degrees of consistency. Some of these have been mentioned, but more striking was the treatment of several parties of prisoners of war during the last six or seven months of the period of captivity.

On 19th December 1944 a party of 200 British and 200 Dutch were taken by train by night from Tamuang base camp to Wampo, a camp memorable for the labour involved in the erection in seventeen days of a 400 yard long wooden bridge which clung to the cliff some 20 feet above the river. They were marched with heavy loads to a jungle camp where they did heavy work under extremely bad conditions. For nearly six months they suffered from lack of food, rest, clothes and shelter; 80 per cent of the men suffered from malnutrition and malaria, and 13 per cent died.

In April 1945 a party of 1,011 left Nakom Paton including over 600 British, half of whom came from Non Pladuk, 120 Australians and 211 Dutch with 6 medical officers. The men from hospital were selected by the Japanese medical officer, who showed no regard for their physical condition. This party formed the Mergui East-West Road force, and suffered hardship and neglect as the result of which over 250 men died.

Even worse was the march from a camp of some 2,000 prisoners at Nakom Naiyek to Pitsanloke. In May 1945 an advance working party of 200 English troops with Captain J. A. Mark R.A.M.C. and a few orderlies was marched off north to an unknown destination. A fortnight later a main party of 700 English and 100 Australians was formed, with a medical attachment consisting of Captain T. le G. Brereton, A.A.M.C., Lieutenant C. J. Poh, S.S.V.F., and eight orderlies. The men in this party were far from fit; many of them were suffering from chronic amoebic dysentery, relapsing malaria and tropical ulcers. They had to push in hand carts loads taken only part of the way in lorries, and could only cover ten miles in the heat of the day, spending each night without shelter in heavy rain. They felt keenly the shortage of safe drinking water. Sick were carried on the cooks' trucks or on litters. They met Captain Mark's party at Lopburi. Medical supplies were obtained here with money given by the men themselves, and the invalid party benefited from treatment, though there was no quinine and they suffered from exposure and hordes of mosquitoes. There was no train; so the less unfit section of the men marched on. Carts for cooking broke down, and small groups of men cooked their own rice. On 13th August the remains of the invalid party moved by train to Pitsanloke where the men were under shelter and had some days of rest. The other parties arrived by foot after some days. One man had died from smallpox, and another was brought in suffering from the same disease, from which he died. On 22nd August a Japanese colonel told them that hostilities had ceased, and thereafter the food improved, and clothing and drugs, including quinine were obtained.

Of the original 1,000, 985 men reached Pitsanloke. Five died on the march and three others died out of ten who were returned ill. Some 880 men marched the full distance of 370 miles in about eleven weeks. Captain Brereton considered the death rate surprisingly low in view of the conditions, and attributed this to the fact that the men were hardened and immune to prevalent infections, and to their faith that the end was in sight.

During the last months of captivity the maintenance of discipline in the camps was most important. In Nakom Paton it became known that the collapse of Japan might be expected in August or September 1945, but it was difficult to predict what might happen, and provocation was undesirable. In March 1945 the officers were concentrated by the Japanese in Kanburi but the warrant officers and non commissioned officers were valuable in maintaining discipline in Nakom Paton. A secret organisation was set up when the end was soon expected; Lieut-Colonel Dunlop was placed in charge of a body of guards selected from the prisoners of war, and a trusted N.C.O. was placed in charge of each section of huts, with

a few seniors who acted as block and hut sergeant majors. On 14th August the Japanese ordered a day of rest in the base camps and again on the next day. In Nakom Paton as soon as the Japanese commandant informed Lieut-Colonel Coates that the war was over these N.C.Os. took the place of the Japanese guards, and in the matter of minutes the huge hospital compound was under the control of the ex-prisoners, who after due rejoicing awaited the actual day of their liberation. Even in the midst of so great an emotional crisis discipline was maintained. The news did not come so promptly to all areas. At Tamuang the Japanese ordered a concert on 16th August at which the announcement was made by the prisoner-of-war commandant. In Tamuang, as in other base camps, the dramatic change was made without incident, though even two months earlier some tension was felt when the Japanese began to build machine-gun nests. In some of the more remote parts men did not hear the tidings for days.

One immediate material advantage of the cessation of hostilities was the release by the Japanese of Red Cross drugs and clothing in the hospital bases, and men in some camps found supplies in the Japanese stores waiting for just such a day. In Nakom Paton Colonel Coates and his senior officers visited the Japanese camp on the day after the surrender, and offered their help for the many sick; the Japanese colonel feelingly declined assistance.

In this story of three and a half years of endurance we have been, of course, more intimately concerned with the Australian forces, and chiefly with the efforts made by the medical services to protect them from illness and death. That these efforts were not more successful was not due to lack of quality in the work carried out by the medical services of the A.I.F. and other national forces, who worked together in one cause. If the story has in it elements of repetition it is because of the constantly recurring menaces of sub-nutrition, oppressive hardship and infectious disease. Against these trials of the flesh and the greater trials of the spirit the forces on the whole kept their heads high. There were times when courage flagged, especially with the sick. Now and then the patients and others needed encouragement to eat unpalatable food, and there were those who in extremity like Hezekiah turned their face to the wall and would have died; sometimes the will to live flickered and failed, but in the main the greatest asset of the medical services was the spirit of the men themselves, and in particular of their leaders. There were a few who would stoop to meanness and degradation, but the dark places of the heart revealed in the hours of extreme trial are small compared with the light that shines. It is appropriate here to pay special tribute to the orderlies, both trained and untrained in medical work, and the willing volunteers who in performing the most menial, trying and dangerous tasks for those whose health and lives were in the balance sometimes gave their own lives.

APPENDIX

Statement of Income Expenditures Tarsau Hospital Thailand (These sums entirely raised by prisoners of war)

Estimated Income and Expenditure for November and December 1943

Expenditure				Income			
Tarsau Hospital	November	December			November	December	
To Drugs	115	200		By Officers' Subscriptions	3,388	3,330	
Foodstuffs Ordinary Diets:				Hospital Fatigue Pay	480	500	
@ Stg. 2,268		1,690		Hospital Canteen	750	550	
Special Diets—				Sundry Income	105	50	
@ Stg. 4,210	6,478	6,200		Contributions from Outside			
Hospital Equipment	223	250		Camps	980	700	
Soap issues to patients		200		Estimated Deficit	2,468	4,848	
Sundry Expenses	124	50					
Convalescent Depot at Stg.	831	988					
Expenses for patients north of							
Tarsau	400	400					
	8,171	9,978			8,171	9,978	

Note: The Gross Income from the Hospital Canteen is estimated at *Tcls* 1,000 and *Tcls* 800 for November and December respectively but *Tcls* 250 1/4 from each month has been allocated towards Christmas expenditure.

November December				November December			
Tarsau Messing	November	December			November	December	
To Grants to Cookhouses:				By 10% from—			
Camp Cookhouses	1,552	1,862		O.Rs'. Pay	1,394	1,550	
Officers' Cookhouses	288	303		Officers' Pay	1,469	1,486	
Convalescent Depot (@ 2½				Estimated Deficit		117	
stgs)	828	988					
	2,668	3,153					
Estimated Surplus	195						
	2,863	3,153			2,863	3,153	

CHAPTER 27

OTHER PRISON CAMPS IN THE FAR EAST

"B" AND "E" FORCES IN BORNEO

"B" Force. On 9th June 1942 the Japanese called for a force of 8,500 men for working camps on Singapore Island, and a self-contained medical unit was planned to accompany the force. On 15th June the plan was changed, and "B" Force including 1,500 Australians was ordered for an oversea destination. At this time the medical personnel in Changi was ample for requirements, and in order to provide adequate medical attention for the force, an establishment of 148 was built up, which included 118 from the 2/10th Field Ambulance. In the team there were thirteen medical and two dental officers, and one R.M.O. was assigned to each 500 troops. Medical equipment sufficient for two months was taken, and, with forethought, four large "dixies". "B" Force consisted of 1,494 of all ranks, of whom 145 were officers and 312 N.C.Os.: numbers of them were not really fit, many had had malaria, and many had dysentery and some were possibly still infective. Lieut-Colonel E. MacA. Sheppard was S.M.O. of the force. Assurances had been given by the Japanese that conditions and food would be good, but the nine days' voyage on the *Ubi Maru* to Sandakan in Borneo was an ordeal. The men were herded together in the holds, with practically no ventilation; meals consisted of limed rice and gristly stew, sanitation was unhygienic and inadequate, and drinking water was meagre and not chlorinated. The troops disembarked at Sandakan after a brief perfunctory spraying with some disinfectant, and on 18th July were paraded for a march of eight miles to the Sandakan prisoner-of-war camp.

The men were very crowded in the camp, which was designed for some 300 internees, and had to provide sanitary facilities at once, as none were existent. Specimens for bacteriological examination had been ordered by the Japanese doctor to be taken before the men left the ship, and similar tests were made on later occasions, but no precautionary measures were adopted as a result. In this camp steps were taken at once to provide hut accommodation for the sick, and to ensure a water supply. Three hospital huts were permitted, and by partitioning, space was obtained for some surgical and pathological work and dispensing. The supply of sulphapyridine tablets, used sparingly for severe cases of dysentery, was demanded by the Japanese guards for self-treatment of venereal disease, and was therefore kept in safety. The diet was deficient in protein and fat and proof of its lack of essential food constituents and vitamins was soon evidenced by the appearance of beriberi, scrotal dermatitis and painful feet. Some food extras were procured by the Red Cross representative, using 350 dollars given him in Changi, and small amounts of milk, eggs and other products, together with scanty stores brought on the ship were of help but did not last long. Lieut-Colonel Sheppard managed to

make contact with Dr J. Taylor, at the civilian hospital, who freely and generously assisted by giving valuable drugs and other materials from his own supplies. On later occasions a medical officer was sent with burial parties to Sandakan, and many small and badly needed parcels of medical supplies were taken back to camp in the officer's pocket.

Deaths were not infrequently due to dysentery and malaria, these being terminal infections in malnourished and fatigued men. They were engaged in laborious work on the aerodrome of Sandakan, and not only were they worked long hours, but they were not excused by reason of illness unless completely incapacitated in bed. More huts were needed for hospital purposes as time went on, and by September defective vision was added to the existing deficiency diseases, and skin disease, scabies and tinea in particular became prevalent. Water was scarce for washing and even for drinking, and though special hygiene officers made efforts to maintain a satisfactory standard the general conditions were poor.

Review of the Australians in "B" Force by the medical officers showed that out of 1,469 men, 101 were permanently unfit, 200 unfit for a period of 12 months, 176 for 6 months, and 236 unfit temporarily for 6 months, a total of 713. The Japanese ignored these figures, and the guards continued to select men for work as they pleased. There was the usual discrimination against non-workers, who received a much smaller ration than workers, making it difficult for sick men to make a recovery.

On 27th October 1942 a party consisting chiefly of officers was moved from Sandakan to Kuching. Sheppard handed over to Major Rayson as S.M.O. in Sandakan, and he and the rest of the party sailed on the *Riangor* for Kuching, and arrived there on 3rd November. Sheppard at least felt confident that the field ambulance personnel remaining at Sandakan would show the good results of their training and devotion as they had in the past. On arrival at Kuching the officers were paraded before Major Suga who promised that cooking and hygiene arrangements would be ready in twenty-four hours, but in fact they had to depend on Javanese and Indonesians in the next compound for food for some days. The diet was chiefly rice, but supplements of fruit could be obtained, though requests for permission for Red Cross help produced no result. By the end of the year the incidence of septic sores was increasing, and deficiency amblyopia was becoming more severe. Practically no drugs were held by the Australian party, and though many complaints at sick parades were made they were often trivial and due in part to lack of occupation. Though the officers were on the whole well treated they had little opportunity for diversion or exercise and knew nothing of what was happening at Sandakan.

Early in January Sheppard was allowed to attend a deputation which asked that more European food be provided for patients, seeing that 600 men out of 1,000 were unfit owing to beriberi and skin conditions. The basic diet only contained 44 grammes of protein, and its caloric value was only 1,600, but no improvement followed.

At this time Sheppard was allowed to visit the Kuching camp hospital, and encountered occasional violence from the guards. The hospital consisted of three huts, and housed British, Australian and Dutch privates and civilian internees. The patients were closely crowded: in the main hut over fifty patients were lying, and twenty more were exposed to the elements on the verandah. The standard of accommodation was very low, and facilities were almost non-existent. Later a hut was built for tuberculous patients. There was also an R.A.P. which was sometimes useful for the passing of messages or money for food.

"E" Force. On 28th March 1943 "E" Force, including some 500 A.I.F. troops left Singapore for an overseas destination and arrived at Kuching after a bad trip in a small ship of 1,000 tons with deplorable arrangements. Major H. H. Eddey was S.M.O. to the force, which included two other medical officers and eight other ranks. After being staged at Kuching for a week, "E" Force went to Sandakan, and was quartered on Berhala Island in Sandakan Bay, and several weeks later, was transferred to the main camp at Sandakan, there meeting "B" Force again. Conditions were fairly good at first, though the work was hard and supervision often harsh, rations were increased and some recreational facilities were allowed. But in August 1943 wireless sets were found, and as the Japanese suspected a plot, all officers of both forces were sent to Kuching, with the exception of several combatant officers, three medical officers and two chaplains. In Kuching, the medical officers of "E" Force had nothing to do but assist in looking after a compound of 140 officers. Before leaving Sandakan Eddey noted that no fresh cases of dysentery occurred, and thought that this was due not only to the activity of the hygiene squads, but also to the administration of dysentery vaccine to all the men on their arrival. This vaccine was also used in Kuching in 1943 and early in 1944, but no outbreak of dysentery occurred till 1945 when general resistance was lowest.

Another observation made in Sandakan was that improvement was noted in tropical ulcers after a sharp bout of malarial fever. On the hypothesis that fever *per se* might raise immunity, artificial fever was induced with peptone with good results in early cases, and with some limitation of extension in the severer ulcers.

1943 to 1944. The Japanese required an oath to be taken that no attempt would be made to escape. Lieut-Colonels Walsh and Sheppard and Major Rayson at the head of a parade of over 1,400 men refused to sign the second part in which they were to request the Japanese to "shoot to death" any attempting escape, but they compromised by stating that they understood that any escaping would be shot.

The officers of "B" and "E" Forces at Kuching were quite out of touch with their men at Sandakan. As previously noted, the medical activities in Kuching were slight. The same difficulties persisted in obtaining a reasonable diet and even rudimentary facilities for necessary medical work. In three and a half years of life in prison camps in Borneo only

one-sixth of a Red Cross parcel to each man was distributed by the Japanese. The rice ration was about 4 ounces per man daily. Malnutrition caused most of the invalidity, and was the chief cause of 600 deaths in the compounds at Kuching.

During the later period the condition of the men deteriorated greatly in Sandakan; to the steady weakening of exhaustion and starvation were added infections by malaria and dysentery and the death rate mounted. As in other areas the attitude of the Japanese was modified by the falling of the tide of their success, and more consideration was paid by them in some ways to the needs of the sick.

The fate of "B" and "E" Forces. When the end of the war was coming into sight, fearing no doubt an invasion of Borneo by the Allied forces, the Japanese in several theatres of war sent bodies of men out on forced marches, and submitted them to brutality which few survived. All who could walk at all were sent 140 miles on foot inland over dense jungle from Sandakan to Ranau, and there "set to perform superhuman work on starvation rations". The first march to Ranau left Sandakan at the end of January 1945. Those who fell out sick or exhausted on the journey met the same fate as those who survived the labours at Ranau and were killed. Continued neglect and starvation of those left sick at Sandakan despatched these by famine and pestilence as surely as by the sword, and of 2,400 soldiers at Sandakan only six survived. These men were at last rescued by the liberators who found them living with natives, the last witnesses of the fate of "B" and "E" Forces. Fortunately the swift movement of events following the landings at Brunei and Labuan prevented the possibility of similar tactics elsewhere in Borneo. The officers at Kuching thought that they were destined for a similar fate, and intelligence information suggested that the end would come in September: fortunately the day of freedom was closer at hand.

The civilian hospital in Kuching previously used by the Japanese for military casualties was then made available to the prisoners of war. Major Eddey and Captain I. C. Heinz headed a medical detachment that took over this hospital and found a deplorable state of neglect which needed the hard work of a coolie gang in association with the prisoners of war before normal service could be restored. This made possible prompt measures of resuscitation, as is told in Chapter 28, and saved the needless sacrifice of valuable lives.

PRISONERS OF WAR IN JAPAN

THE TRANSPORT OF PRISONERS TO JAPAN

Prisoners of war of several nationalities reached Japan at different times and were immured in camps scattered over Japan and other areas under Japanese control. After reaching Japan they were also subject to movements from camp to camp, where conditions varied according to geographical and climatic differences, administration and the fortunes of war. Australians were scattered in various camps from Formosa to Manchuria,

and were included in numbers of working parties in the islands of Japan itself. Some of the groups of servicemen and women (for there was one small party of nurses) came from Singapore Island, others from Burma, Thailand, and Indo-China and New Britain.

From H.M.A.S. Perth. Shortly after midnight on 28th February 1942 H.M.A.S. *Perth* was sunk in action in the Sunda Straits, and many casualties were sustained, particularly after the order had been given to abandon ship. Many of the more severely wounded did not survive the ordeal of hours in the water, which was covered densely with fuel oil. Surgeon-Lieutenant S. E. L. Stening, R.A.N. who was wounded, was amongst those saved; they were picked up by a Japanese destroyer and transferred to the *Somedong Maru*, on which they were imprisoned for a week. After some days a Japanese army surgeon came with two assistants and good equipment, and with the help of Stening and a petty officer dressed the wounds, though insufficient dressings were left for after-care. Some 300 men were then taken to Serang in trucks, where they were kept in the gaol and a cinema. Only after ten days were the medical officers released from gaol cells. Stening had only a dressing forceps and scissors and very few dressings with which to work, and quite inadequate drugs to treat the dysentery and malaria which soon beset the 600 men in the prison compounds. After a month, during which two deaths occurred, Stening and twelve other officers were taken to Batavia and shipped to Japan. They arrived at Moji on 5th May 1942 and were taken to an interrogation camp near Yokohama, where they were prohibited from communication with others and starved on a good but inadequate 1,200 Calorie ration for five months.

Senior officers' party. The first party to leave Singapore was the senior officers' party, whose removal from the capitulated forces in Malaya followed the usual procedure for prisoners of war. On 16th August 1942 forty-seven senior officers were sent from Changi, and Palembang in Sumatra. Included in the party were Colonels A. P. Derham, D. C. Pigdon and E. R. White of the A.A.M.C.; Captain D. J. Brennan acted as the medical officer of the party. General Percival objected strongly to the ship originally selected, and the party embarked on another, one of an escorted convoy which travelled at a very low speed. The trip was similar to others on Japanese sea transports; there was gross overcrowding, and washing and sanitary facilities were lacking, with a resultant outbreak of dysentery. Food was very bad, and the officers were only allowed in batches up from the holds where the heat under the steel decks was very trying. After a voyage of three weeks they disembarked at a port in the south of Formosa in September, and were finally moved to a camp on the north-east coast, where only the scenic features were pleasant. Work was demanded of all the party on farms which they made out of bush-land. They were treated like coolies, and were not immune from physical violence for trifling or imagined offences. They were not permitted to enjoy any but a small proportion of the products of their toil. On July

9th 1943 they were moved again to Shiri Kawa, near Nagi, close to the south-west coast of Formosa, where malaria was rife. In October 1944 another move was made to southern Japan, as Formosa was threatened by the Americans in the Philippines. On this journey to Moji gross discomfort was suffered by the 259 prisoners of war on board, herded together in semi-darkness. The ship was detained for three weeks by fears of air attacks, when alarms came the crew used to leave the ship with prisoners in the holds. Eventually the ship escaped safely and reached Japan without escort. The party was taken to Beppo, a popular resort, where conditions were better, and then after a couple of months, went via a south Korean port to Manchuria. Conditions here were very trying owing to the intense cold and will be described later.

From Rabaul. The medical officers and nurses taken prisoner in Rabaul were moved to Japan during July 1942, as previously described in Chapter 22. Though they travelled under conditions of some discomfort they at least had the fortune not to be drafted to the *Montevideo Maru* which was sunk on the voyage. Six members of the A.A.N.S. and thirteen civilians were in the group which reached Japan. The nurses had cared for Australians in the Kokopo camp hospital in Rabaul after the invasion, though with scant facilities. Two patients died there from exhaustion and dysentery. In Japan they were in a camp in Yokohama, and later were housed in another camp twenty miles from the city, and did not do further nursing work. They were employed on light work, such as knitting small silken bags, and making and gluing envelopes, for which they received small pay, 1 sen per 1,000 envelopes. They suffered from the extreme cold in winter, as little extra warmth was provided. Showers were unheated, and in winter water had to be drawn from a frozen pump. One small piece of soap was allowed per month. Clothing included four yards of warm material, but little else, and wooden clogs. Diet consisted chiefly of rice, decreasing in quantity as time went on, some mouldy bread, small amounts of vegetable, with a little potato and sweet potato, and a little dried fish or fish soup. Fruit was rarely seen. Malaria and dysentery were the chief diseases of the camp, and small quantities of aspirin and quinine the only drugs. During three years only one official visit from a Red Cross representative was allowed, in July 1945; twelve individual parcels were distributed and one bulk package. No correspondence was received.

Singapore Maru from Java. Late in October 1942 a party of 1,000 prisoners of war was sent on a cargo ship, the *Singapore Maru* from Java and Singapore to Japan. In this party were included patients convalescing from dysentery in Java and Singapore so as to make up the numbers of the draft. On the ship were stocks of European type food, probably from Red Cross stores, but little of this reached the prisoners, as the illiterate Japanese soldiers threw most of it away. A few days out from Singapore an epidemic of dysentery broke out, and fanned by the intense heat in the overcrowded holds, the poor diet, and the completely

inadequate sanitary arrangements, flamed into an outbreak which killed ninety men before the ship reached Japan. A large medical party was sent from the Zentsuji camp to attend to the sick at the docks. There shivering sick men stood on the pier in the bitter cold with no winter clothing, and in the hold others lay sick, dead and dying in masses of filth. Among them completely exhausted was Gunner C. W. Peacock R.A., who for three days had laboured night and day to help the helpless. The dead were removed, and fifty-six men were taken to a disused quarantine station at Shimonoseki and there looked after by a section of the medical party. Medical supplies were most inadequate for dying men for whom only a few flasks of saline could be obtained. Diet for the sick was rice water or gruel, a little rice and later watery soup. Other sections cared for less urgently ill men in Kokoura Army Hospital and in a Y.M.C.A. building, and lesser emergencies from *Singapore Maru* were treated in camps at Nagasaki.

"C" Force. "C" Force was a detachment which was assembled at Adam Park working camp on Singapore Island in November 1942 as a working force for Japan. Captain A. K. Barrett and fourteen other ranks formed the medical detachment for the force, which was commanded by Lieut-Colonel A. Robertson. The medical party was not permitted to visit Changi to obtain medical supplies, but some were sent from Changi before they left in December. Later that month the force, which numbered some 600 men, arrived at Nagasaki where they were separated. Three hundred went to Kobe under separate command, and the remainder, chiefly 2/20th Battalion men, with some from the 2/18th and 2/19th Battalions were sent to Naoetsu on the west coast of Honshu. The men were set to work at two factories, making stainless steel and chemicals, and during the summer also unloaded coal barges in intense heat.

About two months after their arrival Robertson died from meningitis, and Captain J. Chisholm took over the command. The winter was exceedingly cold, and snow drifts were up to 16 feet deep. For the first year treatment was described by the men as "most brutal", and during this winter about forty men suffering from malnutrition and avitaminosis died of pneumonia. Working conditions were severe, and throughout the whole period food was poor and inadequate. Only a small proportion of Red Cross supplies arriving in the camp reached the prisoners of war. Sixty deaths occurred in the first thirteen months, but after this, though working conditions remained severe, general treatment improved somewhat, and no more deaths occurred in "C" Force. The personnel in the camp changed considerably. Eight officers were sent to Zentsuji, and in 1943 about thirty Dutch and Javanese and twenty British joined the camp. In January 1945 the camp was filled by the arrival of some 400 Americans. From this time onwards till August 1945 general conditions and treatment by the Japanese deteriorated greatly.

Two of the largest parties sent to Japan were "G" and "J" Forces which left Singapore on 25th April and 15th May 1943.

"G" Force comprised 200 Australians, 300 British and 1,000 Dutch, under the command of Major R. V. Glasgow. By order of the Japanese no medical officers or orderlies joined the party, but four British and one Dutch orderly were sent unofficially, and the A.D.M.S. A.I.F. sent two medical panniers. At a later date Major J. F. Akeroyd and Surgeon-Lieutenant Stening were attached to the force. During the journey of three and a half weeks 1,500 men occupied the holds, each man only having a space of 5 x 2 x 4 feet. Sanitation was inadequate, and there were no facilities for ablutions. Dysentery broke out on the second day; men were segregated in sick bays on deck by permission of the Japanese, and the efforts of a signals officer and six medical orderlies controlled the outbreak. The force went to Taisho sub-camp at Osaka and worked at the Osaka iron works. About April 1945 the bulk of *"G" Force* transferred to Takefu camp, and after the capitulation, Major Glasgow and Lieutenant L. A. R. Evans became Allied administrators of Takefu.

"J" Force, made up of 600 British and 300 Australian troops, mainly convalescents, left Keppel Harbour in convoy on 15th May 1943. Lieut-Colonel L. J. Byrne commanded the A.I.F. troops, and Major F. J. Murray was S.M.O., with two other medical officers, one A.I.F. and one British, and thirty medical orderlies. The voyage, at a speed of six knots took twenty-three days with halts at Saigon and Formosa, and the ship reached Moji in Japan on 7th June after a narrow escape from being torpedoed. The diet was monotonous, rice, thin soup and some vegetables; a small case of marmite promised at Selarang was never found on the ship. This was unfortunate, as it was wanted for fifty Australians with ocular deficiency disease.

The force had no important illness and after the rituals of glass rod tests and disinfectant spraying by the Japanese they disembarked at Moji. There *"J" Force* was sub-divided. One party of 150, of whom 50 were Australian, was made up of sick and convalescent, and left for a rest camp near Moji, but made no further contact with the other parts of the force. A party of 250 A.I.F. went by train to Kobe, and a third party of 500 also travelled by train to Hokkaido.

Most of the other forces sent to Japan were made up of men who had been in the working camps of Burma and Thailand.

From Burma and Thailand. After *"J" Force* had left Singapore several other parties were assembled in Thailand during 1944, to be sent as labour forces in Japan where the need for reinforcement of industry was growing. By this time Allied bombing of ports and shipping and areas concerned with war industries was becoming more intense, and attacks on southern Thailand and Indio-China caused some alterations in these plans. Some of the Thailand forces were returned to Singapore Island, and were not further moved. Others were moved to Singapore Island as a preliminary to transfer to Japan. One of these was largely a British force which was concentrated during May and June 1944 at Tamuang, and thence taken to River Valley Road camp. Another party was assembled in

groups of 150 at Tamarkan, two of which were embarked for Japan; 950 men on the captured *President Harrison*, renamed *Kachidoki Maru*, and 600 British and 716 Australian troops on the *Rokyu Maru*, which also carried Brigadier Varley, A.I.F., Group Captain Moore, R.A.F., and Colonel Melton of the American Air Force. These ships bore no evidence of carrying prisoners of war when they sailed in convoy on 4th September 1944. Both vessels were torpedoed off Hainan Island on the 12th/13th September. The *President Harrison* sank in twenty minutes, and the men, who were so crowded that there was only squatting space, had little chance of survival in the oil-covered water.

Various units of the Japanese navy picked up 520 men who were placed on board an oil tanker in Hainan-To Harbour on 15th September. They were suffering from oil burns and the effects of immersion as well as injuries of various kinds, and were virtually helpless. Meanwhile the 1,319 men on the *Rokyu Maru* suffered a similar fate, as this ship was torpedoed early on 12th September and sank twelve hours later. The crowding on the *Rokyu Maru* was even worse than on the other ship, but fortunately none suffered severe injury from the explosions. Destroyers picked up the Japanese survivors, and thus freed more life-boats for troops who were on rafts and wreckage. Among those lost were Brigadier Varley and Major Chalmers. Captain C. R. B. Richards, A.A.M.C., the only officer survivor from *Rokyu Maru*, estimated that by dark some 300-400 men were in life-boats, but it was believed that other boats were sunk by the destroyers, since the only men rescued by a Japanese destroyer during the morning of 14th December were fifty-six British and eighty Australians in four life-boats. The next day this remnant of the force joined the other survivors from the *President Harrison* and tried without other assistance to alleviate their desperate plight. The rescued men were not only exhausted from previous malnutrition, malaria and dysentery, but suffered also from multiple septic sores from immersion and exposure; many had corneal ulceration from irritation by fuel oil. Richards helped to organise parties of the less affected men from the *Rokyu Maru* to care for them. The Japanese refused to put them on shore for further care, and the whole party was transferred to a whaling mother ship which sailed for Japan on 16th September. There was at least more room on this ship, and the same ration was issued as to the Japanese survivors. Eight men died on the voyage. On arrival at Moji 300 British troops were moved to Yokohama, an independent party of 50 Australians was sent to Tokyo, and except 10 seriously ill men left at Moji the remaining 290 were sent to Sakata. On arrival at Sakata the men were still suffering from mental and physical exhaustion, enhanced by the effects of immersion and infection of neglected wounds. They were accommodated in a draughty rice store, and suffered greatly from an exceptionally severe winter, during which a number of them died from pneumonia. Some help was given by the Japanese in providing medical care for the men, particularly by civilian doctors who visited the camp.

CONDITIONS IN PRISON CAMPS

Formosa. The senior officers' party from Singapore went to Japan only in passing. From September 1942 this group was in various camps in Formosa (Taiwan) until in 1944 it was moved to a secret destination, which, after a journey *via* Japan and South Korea, proved to be North Manchuria. Conditions in the camps in Formosa were bad. Diet consisted chiefly of rice, with little protein and small amounts of unpalatable boiled greens, and all the officers lost considerable weight. They were subjected to very oppressive conditions and none were immune from physical violence.

The officers' party remained there till October 1944 when they were transferred to a camp in northern Manchuria after three days and nights in a train *via* South Korea. A group of 250 American officers, 50 British and Australian, and later 50 Dutch officers was accommodated in an old barracks.

Manchuria. A camp was established at Mukden in Manchuria on 28th October 1942. In December 1942 the poor conditions were evidenced by the frequency of enteritis, dysentery, pneumonia and beriberi. Malaria was also common.

The Australian officers' party was transferred to the main camp at Mukden in May 1945 where there were some 2,000 other ranks of various nationalities. The general conditions in Mukden were in some ways fair, by comparison with other camps, though there was overcrowding, and the bitter cold of the winter was in itself a hardship. The action of some of the guards, who would violently rouse the officers at night and make them turn out increased the discomfort. Even big coal-burning stoves made little impression on the cold when the outdoor temperature fell to many degrees below freezing point. The American troops who had come direct from the Philippines felt the cold severely. Brennan who was with a group consisting chiefly of Americans with a few British and Australian soldiers found that the burning feet syndrome was particularly common in Manchuria. Dietary supplements of soya bean and baker's yeast benefited all who could obtain them, but there were obvious signs of deficiency states in Mukden, which seemed to be exaggerated by the cold.

Camps in Japan

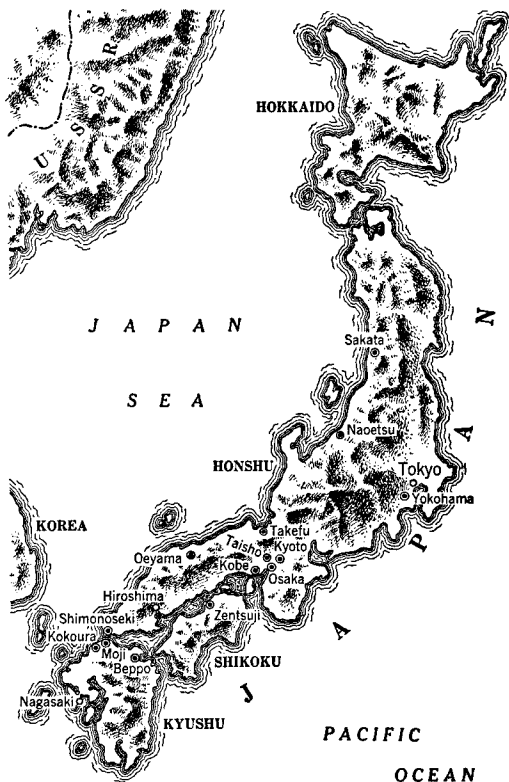
Conditions differed somewhat in various prison camps, in some laborious work imposed hardship, and there was also variation in the rigour of the administration. Some details concerning certain camps illustrate this.

Zentsuji. This was the chief prisoner-of-war camp in Japan in the 1942-1943 period. Here most of the officers were sent, and it was a "show camp". Food was more adequate, and could be prepared by the prisoners' own cooks, and some Red Cross supplies were distributed. Observation and investigation of the diet established that there were definite deficiencies of important constituents, though the clinical manifes-

tations were not so evident as in some other camps. It was found too that deficiencies existed with no obvious results, such as those of calcium and vitamin A. Extra rations were given to men doing hard work. It was from Zentsuji that emergency medical parties were drawn in November 1942 to render special services to the men on the *Singapore Maru* mentioned above.

Yokohama Group—Ofuna. One of the camps near Yokohama to which Australians were taken was Ofuna. Most of the men did not stay

there long as the camp was under naval jurisdiction, and was used purely for interrogation. Most of the prisoners were officers, but this did not save them from violence. Stening on having a difference of opinion with a Japanese medical orderly over a patient, was publicly beaten; so too was the patient. The food in this camp was good, but inadequate in amount; the camp routine was strict and harsh. Breaking of the rules of any kind was frequently punished by physical violence. The trials of interrogation were augmented by beatings and solitary confinement. All medical treatment was done by the Japanese. The physical and mental strains of this camp caused all men to lose weight, deficiency diseases appeared, dysentery of the Flexner type was common. Amenities consisted of Japanese newspapers and conducted walks round the countryside in the summer.



Prisoner-of-war camps, Japan.

Osaka Area. The importance of the Osaka area lay in the presence of the iron works at which many prisoners were required to labour.

(a) *Taisho sub-camp.* "G" Force was sent to this camp, about a mile and a half from the iron works.

Rest days were allowed weekly at first, but later only every fourteen days. Some Red Cross parcels arrived at the camp, but in December 1943 a consignment was kept and consumed by the Japanese prison staff. During 1944 three lots of parcels were distributed to the prisoners and

helped them through a hard winter. Since no medical officers were allowed to accompany this force no attention would have been possible had it not been that Private J. G. Carr carried out duties as a medical orderly with ability and courage, despite beatings by the Japanese. A Japanese medical officer visited the camp at rare intervals, and assistance from this quarter rested with a 2nd class private. Few drugs were available, and Carr had to diagnose the men's complaints and treat them chiefly for malnutrition and dysentery. Repeated efforts failed to secure consideration from the Japanese. On 15th October 1943 Major Akeroyd acted as the camp medical officer till March 1944 and at other periods Stening and Lieutenant Indorf also worked there from June 1944. The advent of these officers improved the medical outlook greatly, not only by reason of their technical ability but of their influence and courage.

The food at first was good, but after a change of the Japanese quartermaster it deteriorated though not to a dangerous degree. A midday ration was supplied at the works, and helped to maintain the men's ability to work, though frequent struggles went on to save sick men from being sent to work. As all men were ordered to work in July 1944 Stening introduced occupational therapy and encouraged men to engage in light work much to their benefit. Though a hard camp its conditions improved in the later period of captivity.

(b) *Ichiko*. A temporary hospital was established in the Osaka area originally for survivors of the sinking of *Lisbon Maru* off Shanghai. From July to October 1943 Stening and Akeroyd worked there to relieve Surgeon-Lieutenant C. A. Jackson R.N.V.R. who had worked alone for a year. Accommodation was fair, but vermin abounded. Rations were very meagre, especially for the sick, owing partly to robbing of the patients and hospital staff. Clothing was scanty also. Treatment was bad, and the frequency of physical punishment for trifling matters, and in particular for interceding for patients increased the tension and mental distress. Jackson acted with great tenacity and courage. Surgical treatment was carried out in a Japanese hospital, and was of a low standard. The death rate here was high owing to starvation and neglect by the detaining power.

(c) *Kobe House, Kobe*. In June 1943, 250 A.I.F. troops of "J" Force arrived at Kobe, and joined 400 other prisoners chiefly British, with a few Americans and others. They were housed in brick warehouses under the medical care of Captain C. R. Boyce. A room in an old wooden building was used as a camp hospital. Space and ventilation were insufficient in these quarters, and sanitation primitive. Diet consisted of rice, some vegetables, irregular quantities of meat or fish, and for a few months, bread rolls. Sick were allowed only half rations, but this was circumvented by equal division of the total rations. Red Cross parcels were issued, but little more than one per man per year. Some clothing was issued. The cold was felt intensely in January 1945, when the indoor temperature sometimes did not rise above 0°C. A good deal of respiratory disease occurred, but no pneumonia. On 17th March 1945 Kobe was bombed and burnt; Kobe House escaped, but on 5th June it was destroyed

by incendiaries and the prisoners carrying their stretcher cases and kits, marched to Kawasaki camp in the hills.

(d) *Kawasaki*. Survivors of the bombing of Kobe prisoner-of-war hospital on 5th June 1945 joined those from Kobe House at Kawasaki, a hutted camp in the foothills behind Kobe. The Kobe prisoner-of-war hospital had been established to take the severer medical and surgical cases from the working camps in the area. After doing useful work this hospital suffered severely in the bombing of Kobe: fortunately enough medical supplies were salvaged and taken to Kawasaki by the "J" Force party to help in the treatment of the survivors. Amongst the victims of the second raid which destroyed Kobe in 1945 were patients in a tuberculosis ward which was hit by a petrol bomb.

(e) *Wakinohama*. The remainder of "J" Force, about fifty men, leaving another twenty at Kawasaki, established a camp in a partly burned school on 21st June 1945. Food was very poor until supplies were dropped after the Japanese surrender. The health of this party remained good, and in spite of the natural tension engendered by air raids there were no cases of anxiety neurosis. Indeed Boyce found only ten in "J" Force.

(f) *Takefu*. This camp was in a valley in the hills north-east of Osaka. "G" Force supplied men for heavy labour at the iron works, where they were engaged in tending electric furnaces, crushing fertiliser, and similar heavy tasks; some of them were on night shifts. Food was fairly good early in 1945, with reasonable supplies of fish, though little meat, but became much scarcer later. One good feature of the camp was that the men were not disturbed in the sleeping huts. Otherwise treatment was harsh and punishments were common. Stening gave medical care to the camp till the capitulation. He continued to have medical supplies brought to Takefu, and in spite of a clash with the Japanese, obtained some Red Cross supplies also. He set up a small hospital and had constant struggles to save sick men from being sent to hard work. Injuries occurred frequently in the works, some caused serious physical damage; skin diseases were common, minor grades of diarrhoea and of beriberi were also seen.

Oeyama. This camp was on the north coast of Honshu Island near a nickel mine and smelting works. It was well laid out with ventilated huts and a separate hospital, food and clothing stores. Water was adequate in quantity but sometimes polluted, and sanitation was poor. Up to early 1944 the personnel were chiefly British and Canadian, but later there were officers of several nationalities. Before the capitulation Glasgow of "G" Force, was in charge of a working party of forty officers, which included a few Australians. Stening was senior officer and medical officer from October 1943 to June 1944. Food deteriorated during 1944. Red Cross food arrived for Christmas 1943, with unfortunate results on some of the enfeebled digestions; further supplies arrived later, but the system of distribution was most unsatisfactory as it rested with the Japanese medical corporal. In April 1945 Stening made a successful protest and appeal to the commandant, and all supplies from the Red Cross were

handed to him for distribution. Hard work and punishment were standard conditions till May 1944 when Stening was allowed to control discipline and punishment; though it placed great responsibility on him the system worked well. This permitted hygienic and medical control, much needed in this camp where most of the men were in poor condition on arrival. Malnutrition was universal amongst them, so too was diarrhoea which often led to serious results. Dental work was done by a local dentist till December, 1943, when Stening took it over himself, and successfully used extemporised instruments, for temporary and emergency treatment.

Sakata. A party of 261 British and 29 Australian troops arrived at Sakata on 3rd October 1944 after the tragic journey in which two transports were torpedoed. Three days later they commenced on coolie type of work; three days' respite were given each month. Issues of clothing were made, as most men had nothing more than shorts or a loin cloth on arrival. The clothes were satisfactory, but, as was general throughout Japan, the boots were not; later only straw slippers could be obtained. Three blankets were allowed in winter, but the men felt the cold severely. The medical officer, Captain Richards, found a more reasonable administration than in Thailand, and Japanese civilian and service doctors tried to give some assistance, though the result was usually slight.

Dysentery was common, and two men died. Amoebic infections and carrier states were discovered also with diagnostic help from British and American medical officers at Shinagawa hospital, where the men in question were successfully treated. Food deficiency diseases were common. Oedema was frequently seen, and as it responded best to vitamin *B* preparations with protein, its cause was apparently twofold; amblyopia was also noted. Neurological changes were usually found in men who were also dehydrated. Several sudden deaths occurred, owing apparently to *shoshin*. Pneumonia appeared in epidemic form during the winter and caused anxiety: there were eight deaths in forty-five attacks, six being recurrences. The overall mortality in Sakata was 6 per cent. General medical conditions were fair in the camp, and essential instruments and medicines were supplied and maintained by the Japanese. One good package of Red Cross medical supplies was received on 1st January 1945. It was a long uphill struggle for the men in this camp to regain reasonable health, but by the time hostilities ceased some headway had been made.

These brief accounts summarise the conditions in most of the camps in Japan to which Australians were sent. Conditions varied from camp to camp, chiefly in regard to the severity of the administration, the hardness of the work, the accommodation and the food. Many Australians experienced a bitter disillusionment on reaching Japan when they found how different was reality from the promises made before they embarked. This disappointment was successfully surmounted, for the men who had suffered hardship in other places had learnt in a school which taught them much in their relations with the Japanese. Some of the later moves of the A.I.F. in Japan brought harder conditions, and as on other fronts, the

termination of the war saved the men from greater physical disability, and even determined their survival.

There was ample evidence that the general population of Japan subsisted on a dietary which is inadequate for Australian people. The occurrence, recurrence and persistence of malnutrition among the A.I.F. troops in Japan is sufficient evidence of the deficiencies in their diet. The same story of constant struggles of medical officers to prevent sick men being exposed to the hazards of toil and bad weather is here repeated. The men often owed much to the courageous protests of the officers. The severity of the winter in Japan, especially the constant cold of the first two months of the year added greatly to the trials of many prisoners.

Boyce in a comprehensive study of "J" Force concluded that survivors emerged with few permanent ill effects. He thought that the A.I.F. though defective in knowledge about matters of health, had better personal hygiene than other forces, possessed greater initiative and adaptability, and responded well to environments involving danger or endurance.

NURSES IN CAPTIVITY IN THE NETHERLANDS EAST INDIES

When the fighting on the Malayan peninsula reached a climactic point, and both the probability of a retirement on Singapore Island and its risks became apparent, the question of returning the seriously ill and wounded to Australia caused anxiety. With this also arose the related question of the members of the nursing service. It was tragic that no evacuation by hospital ship was made while there was yet time. Colonel Derham, A.D.M.S. of the 8th Australian Division, between 20th and 25th January 1942 recommended officially to Major-General Gordon Bennett that the nurses should be sent from Singapore by the first possible hospital ship, and repeated this recommendation before 30th January. On each occasion the recommendation, though supported by Colonel Broadbent, A.A. & Q.M.G., was rejected on the grounds that if carried out it would have a bad effect on the civilian morale of Singapore. Another similar appeal was made on 8th February when the divisional headquarters was at Bukit Timah, on Singapore Island. Derham was informed that he was responsible only for divisional units. However he instructed Glyn White to send as many nurses as he could with any casualties leaving Singapore, and on 10th February, six members of the A.A.N.S. embarked on *Wah Sui* with 120 A.I.F. sick and wounded, by order of Brigadier Stringer. Their movements have been described in Chapter 21. Gordon Bennett then stated that the remaining nurses should be embarked as soon as practicable. On 11th February, at two hours' notice fifty-nine nurses were embarked on the *Empire Star*, and Derham made attempts through Malaya Command and the Naval Liaison Officer to send off the other sisters. The following afternoon the remaining sixty-five sisters and physiotherapists sailed on the *Vyner Brooke*. The *Empire Star* was bombed during the early part of the voyage, and the nurses showed great calm under most alarming conditions. They were in the ship's hold all night with practically no food

or water till the next day, when mass attacks were made on the ship by torpedo-bombers and dive-bombers. Great bravery was shown by nurses who in attending wounded during a raid tried to shield them with their bodies at the risk of their own lives. Numbers of the troops on board were wounded. Fortunately the ship made its escape safely.

The Vyner Brooke party. The *Vyner Brooke* carried some 300 passengers, mostly women and children, and including many Eurasians, Chinese and Malays. The sisters and physiotherapists were the only service personnel on board. The ship was bombed by Japanese aircraft and was abandoned; it sank in Banka Strait off the south-eastern coast of Sumatra. Two of the nurses were wounded by flying splinters. They all suffered excoriations on the hands and chin while making an emergency exit from the ship, and one was struck on the head by a raft. Some of the passengers who contrived to make their escape clung to life-boats and rafts: others were drowned. Some of the survivors landed later at night on Banka Island; some of the nurses landed on Radji Beach, others were picked up by a small launch after being in the water all night, and landed on a pier, not knowing at the time that Japanese were on the island. Most of them were in the water from periods ranging from sixteen to thirty hours: two were separated from the main party and were in the water for seventy-two hours. There seemed no alternative to surrender, so a ship's officer went to Muntok to get the Japanese, who, regardless of all explanations from the nurses that they belonged to the army, took away the men of the party in two groups.

Meanwhile some of the survivors on the beach had started to build a fire, and were joined by others who walked along the beach, carrying sick and wounded, until they had collected a party which awaited the Japanese. This included twenty-two army sisters and ten to twelve sick. When the Japanese arrived an officer ordered them to separate into three groups, officers, other ranks and nurses. They took the men round the beach and shot them, and then bayoneted the officers at the same spot. Returning to the helpless women and sick men the Japanese ordered the nurses to walk into the sea; two were too ill to walk and had to be assisted by others. When they were knee deep in water the Japanese machine-gunned them, and killed all but one. The survivor, Sister V. Bullwinkel, miraculously escaped serious wounding, and regained consciousness to find herself washed ashore lying on her back, while the Japanese were laughing and running up the beach. After a further period of unconsciousness she found herself on the beach, surrounded by the bodies of the others. For three days she remained in the jungle, and there met a wounded Englishman who had survived bayonetting. They subsisted there about ten days, and obtained food from women in a native village, then gave themselves up and were sent to coolie lines by the Japanese on 28th February.

Of the sixty-five servicewomen on the *Vyner Brooke* eleven were lost at sea, and twenty-two were murdered: only thirty-two survivors reached Muntok. Matron Drummond of the 2/13th A.G.H. was shot by the Japanese, Matron Paschke of the 2/10th A.G.H. was drowned after giving

up her place on a raft to a nurse, and Sister Kinsella of the 2/4th C.C.S. was last seen on a raft.

There were hundreds of internees and prisoners of war on Banka Island. Among those taken to the Customs House at Muntok by the Japanese was the main party of the escaped nurses. They were suffering from great exhaustion, severe sunburn of all exposed parts, and abrasions which were fast becoming infected. That night they spent in the Customs House, and had their first meal for three days, a meagre cup of dirty rice. The next evening they were moved to a cinema where there were wounded men of the navy, and air force, whom they cared for as well as possible till they were sent next day to live in coolie lines. Here the Japanese were most offensive and there was no privacy. They lived there for two weeks, and received only a ration of dirty rice, though they were promised pork stew. Meanwhile Sister Bullwinkel had rejoined the party, and the survivors of the nurses on the *Vyner Brooke* with the other internees, were embarked on an overcrowded ship at Muntok. Thus they arrived at Palembang, where the nurses were housed in huts, but were moved out to other houses where the Japanese proposed to start a "club". They were told to attend on the opening night, and all but three sick nurses went together. They were told that only four were to remain, and if they did not comply with Japanese wishes they would be starved. The four who remained returned safely the next morning, but all refused to enter the club again. After further constraint of four nurses selected from a list, the Japanese told them they would have to work for the Japanese. They replied that nursing was the only work they could do, and preferred starvation. Next day a message was sent to the Governor of Palembang through a Dutch doctor, and the nurses were then transferred to bare overcrowded bungalows in another quarter, with up to thirty women in three rooms, and only cement floor to sleep on, with rice bags and curtains for coverings. There were myriads of mosquitoes, wood was extremely scarce, forcing them to use part of the structure of the house, and sanitation was very primitive.

Their diet was at first rice and vegetables: the rice was mouldy or weevilly, but later it became more meagre, though very minute portions of duck were sometimes added. The nurses had no money and therefore could not buy food at the camp canteen, where beans, sugar and fruit could be obtained. Several of them suffered from neuritic pains in the extremities, and were admitted to hospital with a diagnosis of beriberi.

In January 1943 a high official came from Singapore to see the members of the nursing services. He promised to transmit their names by radio from Singapore, and kept his word. After this small supplies of tea and sugar were issued.

In September 1943 the nurses were removed to a large desolate camp area in Palembang, near a men's camp. Here they lived in huts, and those who were at all able were required to do manual work. A few British, Australian and Dutch nurses worked in the camp hospital. Food included fish, but the distribution and condition of it and other food was

very unsatisfactory. For the next year their diet was gradually curtailed till they received some two ounces of rice a day, with no sweet potato or fruit as previously, only kang kong in small amounts and morsels of cucumber and beans. A number of nurses had typhoid fever; the others had various ailments such as dengue fever, skin complaints and diarrhoea. Inoculations were carried out by the Japanese for dysentery, typhoid and cholera, and also vaccination for smallpox. In this camp the work was quite heavy. Bowing to guards was obligatory, and slight or alleged offences were punished by a period of standing in the hot sun or by face-slapping.

In October 1944 they were returned to Muntok on Banka Island by a small river boat on which 200 women were herded together with barely sitting space. Though diarrhoea was prevalent a bucket was the only sanitary arrangement provided. After twenty-four hours in fierce heat, they were huddled into a hulk, handling their own baggage, and finally landed, with swollen legs, weak and exhausted. For a couple of weeks they were allowed a slightly better ration by a lenient commandant. Trading by money or barter was the only way to get food, but the Australians had no money, though some borrowed from internees. From November 1944 to April 1945 their starvation ration depended for its protein on five sardines twice a week. The members of the A.A.N.S. joined the hospital staff there and lived in bamboo and attap huts. This camp was in a highly malarious area, and most of the nurses had frequent fevers and shivers, undoubtedly due to malaria. At this time their weight decreased still further, and signs of deficiency increased. Incoordination of the limbs was noticeable, and nocturnal diuresis was frequent. Quinine could only be obtained occasionally in small amounts. A limited water supply was obtained from wells, and washing was difficult except in the rain.

Numbers of people died in this camp at this time, and included in these were four Australian nurses during the period February-March 1945. The immediate causes of death were said to be general malnutrition, beriberi, and malaria. An epidemic of virulent fever known as "Banka fever" broke out here, and numbers of deaths occurred. Food was scarce and there was a black market through the guards.

In April 1945 they were transferred back to Sumatra to a camp at Lubuck Linggau after another appalling journey during which several people died. They were housed in verminous old attap buildings which leaked causing acute discomfort in the rainy season, particularly as overcrowding was extreme. The dietary contained more vegetables, which they supplemented by growing kang kong, spinach and sweet potatoes, but their disturbed digestion could not tolerate this food, and they suffered from discomfort and diarrhoea. By this time most of the nurses had lost two to three stone in weight. The rice diet still produced nocturnal diuresis and diarrhoea which interfered with nightly rest. Four more of the sisters died between April and August 1945; they were buried by their own colleagues.

The women were expected to work hard on maintenance of the camp, and their health steadily deteriorated. Drugs were scarce, in fact non-existent except for quinine and this too was unobtainable for weeks, only some quinine bark in its stead.

On 23rd August 1945 the native guards were sent away and the next day the commandant told them of the peace. Food and medicines became plentiful; extra food was dropped from the air. Parachutists arrived on the 24th and took over the camp till a fortnight later, when English and Australian parachutists came and finally on 16th September train and plane took them to Singapore.

The news of the peace came just in time for some of the nurses, who were very weak. When the male internees from a neighbouring camp were allowed in, they helped the nurses and other women to get extra food by shooting wild pigs. During internment the nurses had very little medical care. On Banka Island they were helped considerably by a Dutch doctor who was afterwards executed by the Japanese.

On admission to hospital in Singapore the nurses were emaciated but, with two exceptions, not oedematous. There seemed no doubt that they had suffered from thiamin deficiency, but there was no evidence of significant cardiac involvement. No optic atrophy was observed. Under a regime of controlled intake with ample protein and vitamin they made good recoveries and found that physiotherapy greatly benefited their muscles, which showed extensive wasting. Symptomatic amenorrhoea was corrected as the physical state responded to a liberal diet. Haemoglobin values were low, but only a few were below 10 grammes. A few also had low plasma protein levels in the blood. When they left Singapore there seemed no reason to doubt that they would make a complete recovery.

Of the sixty-five nurses and physiotherapists on the *Vyner Brooke* only twenty-four survived to return to Australia after three and a half years of captivity. Thirty-three were lost at sea or massacred on Radji Beach, and eight died from starvation or disease.

CHAPTER 28

LIBERATION

WHEN prisoners of war began to return to Australia problems of their correct handling and treatment arose. At that time only prisoners held by European powers were concerned, as the Japanese war was not concluded, but the general principles were the same. The problem was in part physical and in part mental. On the physical side there was little chance of epidemic disease being introduced, since these repatriates spent some time in the United Kingdom and a further period at sea.¹ The general condition of many men was not good; chronic states of malnutrition, specific avitaminosis and dysentery were commonly found, and were sometimes severe. It was expected that these conditions would be even more frequent and severe among the captives of the Japanese when the time of their release came, and that there would be a high incidence of tropical disease. In order to lay down a policy governing the management of all prisoners of war a conference was held at the Australian Army Headquarters well before the situation arose. All branches of the Services concerned were represented, and an appreciation of the medical aspects was requested from the representatives of the D.G.M.S. A number of important principles were enunciated as a result of these discussions.

Adjustment was found necessary of some of the views current after the 1914-1918 war, particularly with regard to the mental reactions of repatriates from prison camps. At one extreme was a school of thought which believed that many would "return to their homes with damaged mentality" (A. L. Vischer *The Barbed Wire Disease*), and at the other extreme was the view that there was no essential difference between the returned serviceman and the repatriated prisoner. Neither of these views was representative or realistic. Experiences with repatriates elsewhere showed that certain behaviour patterns were common, such as degrees of indiscipline, lack of balance, irritability and lack of initiative with resistance to control or suggestion. Some of these might arise from an effaced and usually unjustified sense of guilt, and some from disillusionment, due to an inevitable clash between the idealistic visions of captivity and the realities of a changed personal world. These mental and emotional factors in the men's state could best be countered by understanding, prompt investigation, candour, adequate nutrition and attention to disabilities. Re-education was important, and, while repatriates should be encouraged to regard themselves as normal, psychiatric assessment if necessary should be made early. The medical appreciation stressed the need for comprehension of the time factor; mental and physical reactions induced over a period of several years could not be reversed at short notice. It was further suggested that the term "repatriate" be used instead of "prisoner of war" or its

¹ Men who had been in European prisoner-of-war camps and who were repatriated through the United Kingdom received all immediate necessary medical care there before transfer to Australia.

abbreviations, but unfortunately the term "P.O.W." became firmly entrenched in popular usage.

ORGANISATION OF RECEPTION GROUPS

The general principles thus laid down formed a basis for more detailed organisation, and we may now resume the story at the point of cessation of hostilities with Japan.

Once the critical period had come and passed in which control of the prisoner-of-war camps was assumed by the ex-prisoners themselves there was much organisation to be done. Medical appreciations had to be made of the physical states of the men, particularly those in hospital, information gathered which would help to assess the sick and convalescent in appropriate categories for evacuation purposes, allotment of diets supervised, particularly of extra food being dropped from the air, and technical guidance supplied to medical officers who would undertake the care of men who had been under abnormal conditions of physical stress and malnutrition for three and a half years.

Special reception groups of prisoners of war had been assembled in Australia with a medical organisation which included the 2/14th A.G.H. sent specially to Singapore to look after the sick of the 8th Division. This part of the medical story of the 8th Division A.I.F. is not so self-contained as that previously narrated, for after 15th August 1945 it becomes part of the general story of liberation of all who had been in enemy prison camps. But in the present instance we are concerned only with the final phases of the service of the 8th Division in its medical aspects.

The Malayan Zone

The general position as it affected Australian prisoners of war on 1st September 1945 was outlined in an appreciation by the Acting A.D.M.S. Singapore, Lieut-Colonel J. Glyn White.

There were 5,557 members of the A.I.F. in the Singapore Island area on 8th September 1945, 4,609 in Changi, 740 in Kranji and 208 in Adam Park and Tanjong Pagar. Their general health was poor. The recently improved rations had produced beneficial effects in most of the men, but gross malnutrition was the rule. Oedema and gastro-enteritis were rather more frequent, and other deficiency diseases were common. About 80 to 85 per cent of the men had malaria, and amoebic infections were common. Hospital facilities on the island were primitive, and drug supplies still deficient, though issues since liberation had helped greatly. Australian medical staff numbered 635, 44 being medical officers; all these were much in need of relief.

Bye, senior physician, Changi prisoner-of-war hospital made a detailed medical appreciation of the position, and Neal, D.D.M.S. of the prisoner-of-war camps in Malaya after consultation with him issued a statement of the guiding principles for treatment of medical conditions affecting the ex-prisoners. This was circulated to medical officers including those on transports. Bye's report stated that there were about 500 men with beriberi

either in hospital or in their lines, that over 600 cases of primary malaria had been seen during the preceding three months, when no preventive measures were permitted. He further warned that the men were wasted and exhausted, readily fatigued, had low resistance to disease, and were all either temporarily or permanently unfit for war service. A rapid survey classed the men as follows:

Class A	Fit to travel by troopship on ordinary rations	Nil
Class B	Fit to travel by troopship on convalescent rations	1,052
Class C	Fit to travel by sea ambulance transport	2,920
Class D	Fit to travel by hospital ship	1,487
Class E	Unfit to travel at the moment	101
Class F	Dangerously ill (included in Class E)	16

The sick included only six with pulmonary tuberculosis and ten with mental disorder.

This classification was based on instructions given to medical teams sent into the camps by various routes, including by parachute, but was not regarded as satisfactory by Lieut-Colonel G. T. Gibson, A.D.M.S. of the 2nd Australian Prisoner-of-War Reception Group (S.E.A.C.). He pointed out that even the "fit" were suffering from chronic infections and malnutrition in varying degree, and insisted that the Australians travelling by ship should be classified as (a) may be repatriated in a troopship with cabin accommodation, (b) may be repatriated in a troopship in troop deck accommodation and (c) must be repatriated by hospital ship. It was further required that troopships must have adequate medical and hospital facilities, that they be rationed on a liberal scale according to Australian standards, and that troop decks should not be loaded beyond 60 per cent capacity. At Singapore the *Duntroon* was rated to carry 1,300, but Gibson refused to assent to load more than 800. After a struggle these requirements were satisfied, and the Australian classification was adopted.

Evacuations from Java, Thailand *via* Bangkok, and Sumatra was carried out by aircraft to Singapore. From Singapore 1,180 were repatriated to Australia by hospital ship, and 4,837 by troop transport, a total of 6,017, including about 500 civilians and members of the three armed forces.

The inability of many men to withstand any strain made it advisable that they should be given adequate preliminary treatment before evacuation. Arrangements for anti-malarial service were also necessary, and preferably also for suppressive treatment. The Changi area had also been subjected to a malarial survey by Lieut-Colonel J. H. Strahan, R.A.M.C., and local preventive measures had been outlined. The notes on guiding principles of treatment contained a brief description of the prevalent medical conditions and their treatment. These may be summarised as follows. Oedematous beriberi and oedema due to other causes were still appearing and would continue to appear, especially after outbreaks of dysentery or malaria. Mild oedema would respond to 5 to 10 mgms. of

thiamin a day, more massive oedema or that associated with infection of up to 25 mgms. daily. Anasarca or ascites would need even larger doses by injection, and in addition mercurial diuretics or even aspiration. The warning was given that many patients were "thiamin resistant" and would need prolonged treatment. Cardiac beriberi needed close care, especially when associated with attacks of nocturnal dyspnoea; large injections of thiamin were needed, and other appropriate treatment for cardiac failure. The danger of sudden ventricular arrest was stressed, and the subject of sudden death in beriberi fully described. It was noted that pellagroid deficiencies might recur: special care was advised in limiting exposure to the sun. The importance of investigation of amblyopia due to dietetic deficiency was stressed.

The importance of diarrhoea as a clinical symptom was rightly emphasised, and a cautionary line in capitals in these notes stated the "the commonest cause of death is the combination of malaria, oedema and diarrhoea". Though diarrhoea occurring recently among the troops had not commonly been due to bacillary dysentery but rather to alterations in food habits, there was evidence that atrophic changes in the intestine following malnutrition could be a contributory cause. Numbers of men after changing from a low caloric Asiatic type of diet to a high caloric diet rich in protein and fat had suffered attacks of anorexia, fever, vomiting, colic and diarrhoea. It was likely that these would continue for a time. Caution was necessary in treatment, in which it was advisable to use sulphaguanidine after careful evaluation of symptoms, to give a bland fluid diet, to anticipate vitamin deficiency and to watch for dehydration and collapse, which would call for prompt intravenous use of fluids.

Another memorandum was compiled by Cotter Harvey and the medical staff of Kranji hospital setting out recommendations for the accurate investigation of prisoners of war. This included the taking of an accurate history, and making a full routine medical examination, including measurement of weight and assessment of the proper weight of the man in health. Special examinations included a thick film of the blood, routine stool examination and micro-radiography of the chest, and also sigmoidoscopy where appropriate indications existed. Particular care was advised in the noting of any signs of deficiency disease and venereal disease.

These products of the experience of the medical officers of the 8th Division were used in deciding on the procedures to be followed. Gibson, on arrival in Singapore found that all necessary technical information had been prepared for the medical preliminaries for repatriation, and commended this as "a faultless synopsis of medical conditions". The medical arrangements prior to reoccupation of Singapore Island included an Australian hospital under Summons at Changi, with a British wing, and a British hospital at Kranji, under Webster with an Australian wing attached. After the reoccupation of Singapore the R.A.M.C. transferred British sick from Changi to Singapore General Hospital, and took over the medical care of the Dutch. The Australian sick in Kranji remained there awaiting evacuation by sea. This was expected to be undertaken by the hospital

ship *Manunda* about 14th September, and *Oranje* about 15th-17th September. These movements would practically empty the A.I.F. hospitals. The sick Australians from Bangkok were expected to number about 1,200, about 450 of whom would require transport by hospital ship, after which the remainder could be flown out.

Glyn White had arranged for the 2/14th Australian General Hospital to occupy St. Patrick's School in Singapore, occupied during the turbulent day of the fighting for Singapore Island by the 2/13th A.G.H. He had maintained full records of the A.I.F. troops on Singapore Island and adjoining areas, thus simplifying the embarkation procedure. On 10th September an advanced air-borne medical party of sixty-three arrived, after a short stay at Morotai, where they discussed problems with the A.D.M.S. of 9th Division, Colonel Lempriere. The journey was completed in barges from the flying boats, and by lorries to Changi, when some of the strain on the 8th Division medical staff could be relieved. Further relief was promptly given when the 2/14th A.G.H. arrived. This hospital was working as a 200 bed hospital at Townsville on 10th August 1945, and was reorganised, equipped and staffed, and finally concentrated at Ingleburn, N.S.W. on 22nd to 27th August. Under command of Colonel W. E. E. Langford, with Lieut-Colonel J. M. Buchanan in charge of surgical wards and Lieut-Colonel C. Fortune of medical wards, the unit arrived in Singapore on 13th September 1945.

The unit was well equipped for its special task, though in the haste of assembly certain unessential items were omitted, and a few special pieces of apparatus, such as the portable X-ray unit and electrocardiograph were unserviceable. The Australian Red Cross supplied some valuable additional stores and equipment, as refrigerators for the wards. The 2/14th quickly settled into their site at St. Patrick's school and took over those patients needing further care.

Thanks to the preparatory work of the medical officers on Singapore Island, and of the air-borne advance medical party, the work of the hospital in assessing the needs of each individual and drafting the men accordingly was much simplified. All procedures were so promptly completed that the hospital ships were loaded on arrival and turned round for their homeward journey.

By 15th September patients had been transferred to the *Manunda* and *Oranje*, and an average of thirty-two convalescents were flown out daily by Catalina and Douglas aircraft. In addition the balance of patients in Changi were admitted to the 2/14th A.G.H. in Singapore, where patients too ill for movement were of course retained. The members of the advance medical party were able on 16th September to return to their parent unit, 2/14th A.G.H., and thus the chapter of Changi was closed for the A.I.F. The hospital continued to work smoothly until 2nd November when all its duties were completed, and except for a small rear party which returned with the prisoner-of-war reception group's rear party, the hospital closed and returned to Australia.

In Thailand the bulk of the work of medical evacuation was done by medical officers who had been prisoners of war. At Nakom Paton Major W. E. Fisher was appointed evacuation officer and for seven weeks worked there until 2,238 patients had been moved and many hundreds staged at Nakom Paton from Kanburi and Tamuang.

A disease summary at Nakom Paton just after the Japanese capitulation showed the following figures:

Total Camp	British	Australian	American	Indians	Dutch	Total
Dysentery:						
Bacillary	18	6	—	—	4	28
Amoebic	204	104	7	—	84	399
Tuberculosis	23	3	—	7	21	54
Leprosy	—	—	—	—	2	2
Acute Medical	62	25	—	1	56	144
Acute Surgical	5	11	1	—	24	41
Medical (General)	151	140	9	10	609	919
Chronic Surgical	317	189	12	5	135	658
Mental	9	10	—	—	14	33
Amputations	64	89	2	—	17	172
Chronic Malaria	206	134	—	—	189	529
Others (Fit)	89	286	7	12	576	970
Total	1,148	997	38	35	1,731	3,949

With the exception of the Dutch who made other arrangements, all these men were moved to Bangkok by A.I.F. organisation after investigation and placing in categories. Haemoglobin estimations were done, transfusions performed if necessary, and other indicated treatment carried out. Records were prepared and the men were classified for local or air transport. Major MacGarry, Captain Benson and Captain Davies of the R.A.M.C. carried out this work with Major Fisher. Similar work was done at Bangkok, where ex-prisoner medical staff supervised the first hospital beds until a general hospital was flown in.

Netherlands East Indies

Arrangements were made for the handling and treatment of prisoners of war and internees in Borneo. Advance medical parties visited Kuching, where Colonel Lempriere accompanied a party to ensure the well-being of prisoners of war, particularly with regard to general health and feeding. Hospital accommodation was arranged, and medical officers were detached from medical units such as those at Labuan (2/4th A.G.H. and 2/6th A.G.H.) and 2/5th A.G.H. at Morotai. Lieut-Colonel N. H. Morgan, of 2/12th Australian Field Ambulance was S.M.O. of the force and went with Major A. W. M. Hutson of 2/4th A.G.H. to Kuching with medical supplies. The medical resources also included 2/1st C.C.S. and a con-

valescent camp, and medical officers were specially attached to the 9th Australian Division Reception Camp. In Kuching the Kuching General Hospital was made available by the Japanese, and after elaborate and necessary cleaning it provided much required accommodation. The more fit of the officers of 2/9th and the 2/10th Field Ambulances were able to carry out the preliminary work for the reception of patients. Lieut-Colonel E. MacA. Sheppard, Majors H. Rayson, R. E. Maffey, H. H. Eddey and Captain G. M. Crabbe of the 2/10th Field Ambulance, and Captains F. H. Mills, I. C. Heinz, R. B. Speirs, F. R. Reid and J. Throssell dentists, and Lieutenant J. Kelliher, pharmacist, were found to be safe.

On 13th September, the hospital ship *Wanganella* embarked 524 patients, and 160 troops left on other ships. The 1st Australian Beach Group medical company worked at Lintang Barracks, where most of the prisoners of war had been, and at the loading point in Kuching town. Naval shipping and flying boats dealt with the remainder of the troops.

Evacuation of the Australian prisoners of war in the hands of the Japanese at Ambon was carried out by the navy. Five ships were detailed to remove 168 Australian prisoners of war from Ambon and circulars of instructions were issued to ships without a medical officer. A Dutch medical officer had lists of patients prepared. Thirty-eight men who needed careful medical attention were embarked in H.M.A.S. *Junee* by Surgeon-Lieutenant I. C. Galbraith, R.A.N.R., others in *Glenelg* in care of a sick berth attendant and three medical orderlies, and the remainder in other ships. Categories were drawn up according as the patients had dysentery, malaria, or tropical ulcers; almost all patients had oedema of the lower extremities. An extemporised sick bay was made in *Junee* by isolating the Master Deck and the Port Waist, where sixteen stretchers were accommodated in two tiers. The condition of a number of these men was one of great physical weakness; some were almost helpless. The naval ships disembarked the men at Morotai, where they were taken to the 2/5th A.G.H.

Japan

In the Japanese working camps work ceased on the 15th August 1945 but no information was disclosed. First news came through the Press in Takefu, and by local announcement in other places. Some days afterwards prisoners of war were directed to paint prisoner-of-war signs on the roofs to help in the delivery of supplies from the air. At Takefu a high percentage of supplies was damaged, especially those which landed without parachutes. Unfortunately seven men were injured, one seriously, in these air drops. By the end of August, conference was permitted with Red Cross representatives, and general leave was given to the men to move around the area. On 2nd September the camp at Takefu was handed over to Surgeon-Lieutenant Stening, who assumed responsibility for the conduct of the ex-prisoners. An Australian flag was made and hoisted over Takefu camp. The next day Major R. V. Glasgow, A.I.F. of Oeyama camp assumed command. After all formalities had been fulfilled and medical examinations made by American medical officers the ex-prisoners were

taken by rail transport to embarkation ports whence they sailed *via* Manila to Australia.

At Wakinoama the members of "J" Force who were there were freed from work on 16th August and were given on request supplies of food, and medical and surgical equipment from Japanese stores, though these had been withheld previously for months. An American recovery squad arranged their travel to Yokohama, whence they were flown to Okinawa and Manila.

The officers encamped at Mukden travelled by train to Darien near Port Arthur, at the end of August, when the Russians had re-opened the railways. Thence the party went by escorted hospital ship to Okinawa, escaping the dangers of mines in the Yellow Sea, and running further risk of a cyclone at Okinawa. The ships went out to sea, and avoided the cyclone, and on their return to port the party was flown some to Morotai and others to Balikpapan. The "processing" of the prisoners by Allied recovery groups was smoothly accomplished, and the Australian prisoners in Japan were soon in Australian hands.

These arrangements and movements were representative of the organisation by which the prisoners of war were collected and returned to Australia. Some of the more isolated areas were less accessible, and the time taken for recovery varied but the general pattern was the same.

MEDICAL CONDITION OF PRISONERS OF WAR ON LIBERATION

The diseases to which prisoners of war in the eastern zones were subject have already been dealt with during this narrative. All medical observers who had the liberated men under their care have described these, but the effects of these conditions varied greatly with the stringencies of captivity and the recent opportunities given the men of improving their poor state of nutrition.

Most of the recovered men had received extra food, except some of those who were too ill to benefit by even this advantage. Suppressive atebirin had also been taken by many of the men for one or two weeks, so that malaria amongst them was latent, and the parasites were demonstrated in blood films in only a small proportion. Enlargement of the spleen was rare. Very few cases of acute M.T. infections occurred, including one cerebral malaria, but prompt treatment caused rapid response, and malaria in general caused little trouble. There were no epidemics of bacillary dysentery, though the aftermaths of chronic bacillary or on particular amoebic infections were seen. As the medical officers in Singapore had prophesied, diarrhoea was not usually due to dietetic causes, but only forty-five mild cases of bacillary dysentery were seen among over 6,000 Australians in Singapore, and seventy-three of amoebiasis. Worm infections were common, especially ascaris and hookworm, but heavy infestations did not appear to be common.

Nutritional deficiencies were the most serious menace to health seen in the men. Even the most fit men had lost weight, from one to three stone

in some observed series. In general a loss of about 30 per cent of total normal weight was common. At the other extreme were emaciated helpless patients, with massive oedema of the extremities, and marked ascites, unable to take any ordinary food. Estimations of the haemoglobin often showed a fall to 10 grammes or less, even in those who were fairly well, but in the very ill who had haemodilution and were at the time of examination almost or quite anuric the figures were below this. The plasma protein too fell as low as 3.3 to 4 grammes per 100 millimetres in the most seriously ill, but in those fairly well it was often 6 grammes when examined, after a period of better nutrition. The haemoglobin and plasma protein rapidly rose with correct measures of treatment.

Between these two extremes were numbers of men who had anaemias of various kinds, many microcytic or normocytic, others macrocytic, and reduced blood protein, who could not take ordinary food or any food in large quantities owing to the occurrence of distension, abdominal pain and diarrhoea. All these manifestations were part of the syndrome of starvation, and the old maxims enjoining care of starving men were exemplified in the treatment. Some exceedingly ill men were seen by Major Hutson in Kuching, and were rescued by cautious resuscitation by intravenous infusions of saline and glucose, followed by plasma or serum and then by blood. Only then was fluid assimilable nourishment given, gradually enriched, until fairly frequent feedings of a light diet rich in protein could be given, after which full diet was introduced. Fifty-three men were transfused in Kuching, with 90 pints of blood and 80 litres of serum. The oedema which was so intense in some of these patients usually responded to a raising of the blood protein by intravenous or oral nutrient, together with parenteral dosage of thiamin. In fact it was found advantageous to give 10 milligrammes of vitamin B₁ by injection to each man on admission, followed by three tablets of 3 milligrammes daily and 1 ounce of wheat germ. When iron could be tolerated it was given by mouth, after working up the range of diets till the patient was taking full diet. Ascites sometimes required paracentesis, but mercurial diuretics were also valuable. In at least one case the extraordinarily low output of urine of 25 to 30 c.cms. a day was raised to 116 ounces in ten hours after an injection of "Salyrgan". Gross anasarca usually yielded to the measures described above. The appetite of some of these men during convalescence was colossal, and sometimes required curbing. It was significant that second helpings were usually of protein foods.

Signs of definite avitaminoses were not gross as a rule. Practically every patient gave a history of having oedema of the extremities at some time or other. This was probably a result of combined deficiency of protein and of vitamin B₁ in the diet. Cardiac beriberi was not a feature seen among the men in hospital. Glossitis and sore mouth were not common; occasional pellagroid rashes were seen. At the 2/5th A.G.H. a number of men were seen from Ambon and Sandakan who were ataxic. Numbers of these also had deafness of varying degree. A few were deaf even to loud shouting and stated that the condition began during imprisonment. Other

occasional affections of the central nervous system were pareses of the cranial nerves, and weakness of some peripheral muscle groups. The deep reflexes were frequently absent, and the proportion of men showing signs of B1 deficiency when they came under observation varied from 60 to 80 per cent. The prevalence of disturbances of vision was particularly noted. At least 10 per cent of the Australian officers from Kuching had some visual defect of neuro-retinal type. At Labuan a rapid review showed that 14 per cent had impaired sight.

Skin lesions varied in frequency, depending on the conditions to which the men had been recently subjected. Scabies was very common in some groups, in others residual infections of the skin were frequent. Tropical ulcers also varied in frequency and severity. Numbers of men from Ambon had active ulcers on the legs with periosteal involvement, whereas those from Singapore had no more than healed scars, though these were practically universal. Pulmonary tuberculosis was very rare, and usually terminal or extensive. Psychiatric disturbances were also extremely few. Some of the most seriously ill and emaciated men went through stages of intense depression and had hysterical manifestations, but these were only passing phases, and a hopeful outlook and better mental balance returned as extreme debilitation disappeared.

There was a discernible difference in the condition of various nationalities and types of prisoner. Internees on the whole looked in fairly good condition. The same was true also of the Dutch troops who were believed by other nationalities to have received rather better treatment and food. Indian troops seen at Labuan were also in fair condition, attributed by the men themselves in part to their natural hardiness. They were possibly better suited to the oriental type of ration, and had recently received somewhat better food. The Australians varied in condition considerably according to the area from which they had come, but they were on the whole in better health and nutrition than the British, more of whom were weak and emaciated.

The education and rehabilitation officer on the *Wanganella*, Lieutenant T. H. Roberts, after interviews and close contact with the men on the ship arrived at some interesting conclusions. Discipline was good and irritability was not a feature of their conduct. While recognising that the recovered prisoners of war had not had time to return to a less excited and reactive state of mind, and that anxieties were rather characteristic of this period, he found a slightly self-assertive attitude among many of the men. Reticence in describing experiences was followed by a desire to narrate their achievements. Curiously mingled with confidence was their attitude to the future, but there was a spontaneous consciousness that the Australian scene they knew would have changed. There was, however, discernible the influence of an illusion pointed out by all who have thought and written on the subject, that is, the myth of happy and unchanged surroundings, an environment built within each man's inner life and heart. This joining of the present to the past was symptomatic of a somewhat exalted morale, but gave hope for less difficulty in adjustments than

might have been expected. There was some evidence that those who had been stimulated by educational amenities during the dark days of imprisonment were thinking more clearly and planning to make the most of ambition in the life of the future.

Defensiveness, and some traces of an unjustified sense of guilt were discernible under the surface but there was no bitterness. There was in general every reason for treating these recovered prisoners as normal men; there was good reason for confidence for expecting that the future would find them representatives of the average norm of society.

To this thoughtful estimate of the moral and mental outlook of men who suffered so much for so long may be appended the farewell message of Lieut-Colonel F. G. Galleghan to the A.I.F. troops leaving Singapore. Praising their hard work as a team, without which their survival would not have been possible, he said:

"You finish your prisoner period as disciplined soldiers whom the Jap could not break."

These citizen soldiers were of the same make as those who did the jobs of war at home and abroad on many fronts. They were bound together not by that dubious entity "herd instinct", but by a cohesion of spirit only possible under good leadership. Oppressed by disease and by inescapable reality, they lost neither hope nor individuality, and in this were helped by those who treated their physical ills and constantly strove to shield them from cruelty. Though greatly hampered in this work all ranks of the medical service accepted the challenge to science and to charity, and made the most of opportunities that were at once a responsibility and a privilege.

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